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Contractors and Engineers Monthly

Vol. 39, No. 12

DECEMBER, 1942

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Highlights Of This Issue

• Paving Concrete Runways

An article on the experience of one contractor in paving 1,250,000 square yards of concrete runways at an Army air field includes some interesting information on changes in design to conserve critical materials, as well as in speeding up the work. See page 2.

• Big Tunnel Job

The work on the Continental Divide Tunnel at Estes Park, Colo., a 13.1-mile rock tunnel to divert water from the western slope of the Rockies to supplement inadequate irrigation waters on the eastern slope of the Continental Divide, is described in this issue. See page 2.

• Bituminous Paving

Two articles on bituminous paving on essential routes appear in this issue. One describes oil-mat surfacing on Wyoming's strategic network, and the other the speedy black-topping of 115 miles of roads at a mountain-state Ordnance Depot. See pages 6 and 13.

• County Road Work

County highway departments too have many difficult problems to solve, in order to keep functioning and serve their communities. The work of Lac qui Parle County, Minn., is featured by a simple and efficient accounting system as well as economies necessitated by a small annual budget. The activities of the Highway Department of Brown County, Ohio, are also described in this issue. See pages 9 and 23.

• Snow Removal

Never has it been more essential that our highways be kept open during the winter months, in order to maintain the delivery of vital war materials and essential civilian supplies, and if the weather man isn't on our side this winter, probably never will it have been more difficult to do so, in view of the scarcity of adequate trained snowplow crews and the necessity of making present equipment do the job. How it is done in Colorado, which has had plenty of experience with severe winters, is discussed in this issue. See page 10.

IN THIS ISSUE

Aggregate Production	1
Airport Construction	2, 32, 33
Alaska Highway	18
Bituminous Paving	6, 13
Bridges	35
Care of Equipment	1
Cartoon	4
Concrete Construction	2, 19, 35
County Road Work	9, 23
Dam Construction	19
Editorial	4
Highway Maintenance	27
Highway Shops	1
Soil-Cement Roads	30
Snow Removal	10, 21
Tunnel Construction	2
War Construction	1, 2, 13, 32, 33
Wartime Rulings	49

Save and Substitute, STACK Salvage and Survive



C. & E. M. Photo

An average of 2,181 cubic yards of volcanic cinders was taken out of this cinder mountain daily for road base and top at an Ordnance Depot.

A Cinder Mountain Provides Needed Fill

Nature's Cinder Piles at Old Volcanos Still Provide Excellent Fill: So Used at Southwest Ordnance Depot

• **HUGE** piles, hills and mountains of volcanic cinders exist in our great Southwest where for decades men have used these practically inexhaustible sources of material for ballast, fill and road surfacing. One mountain has been attacked by the Santa Fe Railroad from one side since the earliest days of the line, and from the other side by a state highway department to furnish aggregate for non-skid asphalt surface-treatment pavements. Today, contractors have opened a new pit in a mountain just outside an Ordnance Depot reservation to secure material for well over 100 miles of roads to serve the more than 42 square miles of the reservation and for 6-inch compacted fill under concrete slabs.

After stripping the thin veneer of soil and sparse vegetation with a tractor and bulldozer, the contractors started the real attack. Considerable material was wasted at the start to form a pit floor for trucks and the shovels, and today, after months of operation, the side-hill cut, made in a series of 18-foot faces, is about 80 feet deep and the floor nearly 6 acres.

The cut has been carried to its maximum depth at the present time as the floor is now at the most efficient eleva-

(Concluded on page 14)

• TO keep equipment in top-notch condition and to prevent breakdowns, the Arkansas State Highway Department several years ago instituted a field inspection system that is now paying big dividends, according to C. Don Hayes, Supervisor of Equipment. Only one man was engaged in this work B.P.H. (Before Pearl Harbor), but since that time a second trained inspector has been added. No piece of equipment goes for more than three months without careful scrutiny by a Central Office inspector with a District mechanic. A duplicate report on the condition of the machine is made, one copy is filed with the District Engineer and the other goes to the Central Shops at North Little Rock. The inspector has the authority to issue an "immediate repair order" to protect equipment. Most repairs can be made at the District shops, all ten of which have complete repair facilities, supplemented by the heavier machines and facilities at the Central Shops.

Each District has a budgeted repair fund of \$3,000 to \$5,000 a month while the allotment to the Central Shops is \$8,000. Every effort is made to keep repair expenses down, but knowing that repair is the sine of operation, allotments are increased when necessary.

Hard-Surfacing Wearing Parts

The hard-surfacing program has been intensified as a result of the various freezings and reduction in the availability of parts and equipment. Rock-crusher jaws are now built up with nickel-manganese applicator bars in various sizes and welded to the jaws. This saves about three-quarters the

C. Don Hayes, Supervisor of Equipment, Arkansas Highway Dept. Tells in Interview Where Savings Are Made

amount of welding rod that would be used if all the rebuilding were done with the welding rods alone, and these are becoming increasingly hard to buy. Grousers on tractor treads are built up in the same manner.

At the Central and District Shops there are ten Hobart, General Electric and Westinghouse electric welders. In addition to acetylene welding equipment. At the Central Shops is an Oxweld portable acetylene generator while the District shops rely on cylinders of the gases.

Salvaging Metals

When equipment is taken out of service, every usable bit of metal is salvaged. Cast iron is saved for melting and recasting, and other metals are either saved for reuse at the shops or are placed in bins and sold under competitive bids. The cast iron is sent to the NYA local shops to be melted down and cast into rollers for conveyors. These are rough-machined by the NYA which has provided a continuous stream of new parts for the Department. Old engine blocks, crankcases and other parts are melted and recast for some useful purpose. The final finish machining is done by the Department shops, resulting in accurate work and a real salvage of needed materials.

All cast iron cuttings, as well as brass
(Continued on page 28)

Salvage with a vengeance: picking over the discard pile of detachable bits to see if some may still be reground for further use; at right, steel plates being welded to repair the holes and strengthen a $\frac{1}{2}$ -yard bucket which also received four new teeth from old grader blades.

C. & E. M. Photo



Continental Divide Tunnel

New 13.1-Mile Rock Tunnel For Irrigation and Power

Longest Tunnel Driven from Two Headings Started in June, 1940, Will Be Holed Through in Spring of 1943

(Photos on page 56)

• TWO contractors are now driving beneath the high Rockies, one from Estes Park, Colo., and the other from Grand Lake, Colo., on extended work orders so that they may hole through a 12-foot diameter tunnel in rock 13.1 miles in length in the spring of 1943. This is the first, and longest, of a series of tunnels on the vast Colorado-Big Thompson Project of the Bureau of Reclamation, which will divert surplus water from the headwaters of the Colorado River on the western slope of the Continental Divide to supplement the inadequate irrigation waters on the eastern slope of the Rockies. Included in the project are the Green Mountain Dam, now nearing completion on the western slope, and future construction of Granby and Shadow Mountain Dams, seven other tunnels from 0.5 to 5 miles long, four other storage reservoirs and hydro electric developments capable of producing 700,000,000 kwhr per year. The present irrigation phase of the project will cost about \$55,000,000, of which \$25,000,000 will be repaid to the Federal Government by the benefited members of the Northern Colorado Water Conservancy District.

The Continental Divide Tunnel will be 9.75 feet in diameter inside the concrete lining, is on a slope of 0.00155 which gives a difference in elevation of 107 feet between the portals, and will have a capacity of 550 cfs. The driving involves the removal of 370,000 cubic yards of rock from the tunnel and the placing of 113,000 cubic yards of concrete lining within the tunnel.

Prior Construction

The S. S. Magoffin Co., Inc., of Denver, Colo., completed the first 8,000 feet of tunnel from the east portal on April 2, 1941. Bids were opened February 3, 1941, for the driving of an additional 7,000 feet of tunnel and placing the concrete invert for 14,639 feet. This contract was awarded February 21, 1941, to Magoffin for \$784,711.00. Still operating under a second work order issued in connection with this contract, Magoffin is continuing the driving of the tunnel from the east portal. The extra work order gave the contractor a slight increase in unit prices to compensate for increased costs, including extra power costs, as the work was farther in from the portal.

Bids were opened June 20, 1940, for the excavation of 6,600 feet from the west portal and the contract was awarded to Platt Rogers, Inc., of Pueblo, Colo., on July 15, 1940, for \$389,370.00, and the contract completed June 22, 1941. Bids were opened for the excavation of an additional 8,000 feet and the placing of the concrete invert for 14,200 feet on the west end on June 5, 1941, and the contract awarded to Stiers Bros. Construction Co., of St. Louis, Mo., on June 23, 1941, for \$832,906.00. Work under this second contract has been extended by a work order similar to those on the east portal with no limitation as to distance or time, and with the work on the concrete invert indefinitely postponed.

Character of Rock

The character of the rock in this section of the Rocky Mountains is of interest in connection with the progress in

these two tunnel operations. On the surface, as one drives over the Continental Divide, gulches are noted in the high sections which correspond in spacing with the zones that are found in the log of the tunnel-driving operations. Just which one of these gulches indicates a specific zone in the tunnel cannot be easily determined, for a very slight change in the slope of the fault or break would make a considerable difference in the point it would cross the tunnel line as the distance vertically is about 3,800 feet at the point of maximum elevation of the peaks over the tunnel.

The greater part of the rock between Grand Lake and Estes Park can be placed in two classes, Longs Peak granite and the Idaho Springs formation. The latter composes the oldest rocks of the mountains and consists mostly of biotite, biotite schists and gneisses.

For a short distance on the east end, the tunnel was driven through an alternation of mica schists and pegmatite. The following rock, except for the occurrence of some basalt dikes and scattered



C. & E. M. Photo
The Zimco mucker at the moment an empty was being brought up.

bodies of schist, was granite. After this body of granite was a body of injection biotite gneiss and schist, then another body of granite, with a few bodies of injection gneiss and schist. A few sills of pegmatite also accompanied this body of granite.

The tunnel on the west end was driven through chlorite schist and pegmatite, then amphibole schist and pegmatite, then hornblende schist, pegmatite and granite, then quartz-diorite gneiss and granite, then through alternating bodies of granite and schist, then injection biotite gneiss and schist.

This changing cycle of rocks has necessitated the use of steel supports in a considerable portion of the tunnel excavated thus far. The steel ribs consist of 6-inch H-beams spaced from 1 foot to 6 feet apart, depending on the character of the rock. As of September 1, 1942, the west portal had been driven 17,570 feet and of that 75.35 per cent was unsupported, while at the east portal the tunnel had been driven 30,082 feet and 57.63 per cent of tunnel was unsupported. The high percentage of steel supports in the east portal is probably due to the low cover, which averaged only 700 feet, and fully half of which was glacial cover. At the west portal, on the other hand, the cover has run up to an average of 1,700 feet.

The tunnel is being driven horseshoe shape, with the center of the radius for the arch being 4.88 feet above the top of the concrete invert which is 6 inches thick minimum. The radius of the arch is 5.88 feet in unsupported sections. This gives a section of 112.91 square feet for the unsupported section or a production of 4.18 cubic yards of rock per foot of tunnel, while the 6-inch H-beam rib supported section has an area of 131.80 square feet and produces 4.88 cubic yards per foot of tunnel.

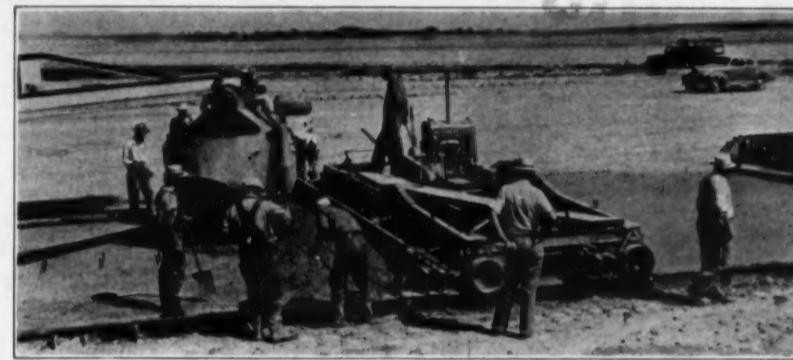
Work from East Portal

Work on the east portal is run on three 8-hour shifts seven days a week, with spare men filling in so that each man works a 48-hour week. Shifts are changed at the heading and, due to the extreme length of the tunnel and the time necessary for safe man transportation to and from the heading, the company pays a travel allowance. This was put into effect at 18,000 feet, with various specified points where the travel allowance is increased.

Each crew does its own drilling, loading and mucking. The cycle for these operations averages about 2 hours and 50 minutes, made up of 1 hour and 30 minutes drilling the round, 8 to 10 minutes lost between the shot and mucking because of the smoke at the heading and the time taken to return to the heading from a safe distance when the shot is fired, and about 1 hour and 10 minutes for mucking.

The placing of the utilities on the sides and bottom of the tunnel so as to

(Continued on page 24)



U. S. Army Photo
Runway paving at an Army air field in the West.

Two Years of Paving On Concrete Runways

One Contractor Pours Over A Million Square Yards at One Air Field; Changes in Design Between '41 and '42

(Photo on page 56)

• THE differences in paving concrete runways at one mountain-state air field between 1941 and 1942 show the effect of the war on construction, both as to materials and the speed of operation required. While the cross section of the 25-foot lanes for the 150-foot wide concrete runways remained the same, steel tie bars down the center of each slab across the longitudinal joint were replaced with plastic center strip. In 1942

Drilling at the face of the east heading of the Continental Divide Tunnel and, at left, the jumbo on one of the California-type switches during loading and firing.

C. & E. M. Photos



two pavers were required to maintain the stepped-up pace, and the problem of hot cement, and the cracks produced by it, came up for solution.

The use of cement almost direct from the kilns and grinders has been a very real problem on many military construction projects this past year. Increased demands for cement in all types of construction have emptied the storage silos of cement companies so that plant production has moved directly to the jobs, with no time for cooling. This has resulted in cracks appearing in concrete slabs (we have seen several instances in runways) even before the surface water had dried from the green concrete. Cracks wide enough to insert a pencil lead from 4 to 6 inches in length have been noted. Inspectors and engineers have tried to stop these cracks by ordering the membrane cure applied before the surface was dry, to no avail. The real answer was found by the contractor who has poured 1,250,000 square yards of concrete runway at this air field. "You tell them," he urges, "that if they will cut down the rock and build up the mortar, they will lick the cracks. I did, when hot cement came along."

Grade and Forms

The runway paving was placed on an 8-inch base of selected gravel, all passing a 1/4-inch screen, to provide bearing over the gumbo subgrade. A Caterpillar No. 12 power grader was used to prepare the grade for the form trench which was cut by a Cleveland Formgrader for the 8.6-8-inch cross section in 25 feet. The Blaw-Knox steel forms were set by two

(Continued on page 38)

Where future "DOOLITTLES" and
"O'HARES" will win their wings



We are not publishing photographs of military air fields, but this illustrates one of the types of TEXACO Asphalt construction employed on such fields.

United Nations' control of the air on all war fronts is a big order.

Training the pilots and other personnel needed to clear the air of Messerschmitts and Zeros takes time—and many modernly-equipped training fields.

America is building those training fields in record-breaking time. And on a number of these fields, both Army and Navy, resilient TEXACO Asphalt runways are being constructed. Not only do the TEXACO-paved runways provide safe, smooth, joint-free surfaces for the take-offs and landings of student pilots, but they have a shock-absorbing durability equal to the demands of the heaviest bomber.



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What's What?

In traveling around the country these past two years, we have found an increasingly loose use of construction terms, particularly where applied to construction equipment. The first instance of this was noted some two years ago when each area or resident engineer of the U. S. Engineer Department was required to report the equipment used by the contractor on his job. On those reports any carry-type scraper for dirt moving was referred to as a "Carryall", the proper name for one of the first machines of this type. The use of a trade name as the general name for a piece of equipment is not new, but it is still inaccurate. We have as the classic example the use of the term "Caterpillar" for every kind, type and make of crawler for tractors or other heavy equipment.

We abhor inaccurate references to equipment as it is misleading and unnecessary. Now we are finding that the rapid shifts of Army engineer personnel are making some strange combinations. Only recently, an area engineer resident on a concrete paving job for some months thought that the finisher was the paver, the paver a mixer, and the drag straight-edge, the finisher. We straightened him out as to the proper designations for use in his reports which must have been rather misleading to some old-timers who received them and had to decode them.

We must have men in the front lines of construction who know "What's What". Today our Army officers with good military training can be used best with troops and leave construction to the able staff of civilian employees whose faithful service for many years has provided the training ground for thousands of men from The Point and also many who have entered from civil life.

We need the trained military man at the front, unless his construction background so far overbalances his military worth that he is more valuable to our all-out war program in the field of construction activity than on the field of military activity.

And in every case let those who make reports and those who provide the forms

use the correct and proper terms for every piece of construction equipment so that there may be no misunderstandings between field and office and district and headquarters. It is a part of military training to know the correct term to use for a maneuver so that it will be executed properly by all branches involved. The construction front is likewise weakened by every evasion of the use of proper terminology. Let's call things by their right names! Don't call a man a "witch" when you mean something else!

A.E.D. Annual Meeting In Chicago, Jan. 11-13

The Associated Equipment Distributors has announced that its 24th Annual Meeting will be held at the Edgewater Beach Hotel, Chicago, Ill., January 11, 12 and 13, 1943. The sessions all day Monday, January 11, and the morning of Tuesday, January 12, will be for distributors only. Beginning with a luncheon on Tuesday, the sessions will be open to both distributors and manufacturers of construction equipment.

President T. W. Harron, San Francisco, Calif., will preside and Vice President E. P. Phillips, Richmond, Va., is Chairman of the Program Committee.

R. S. Patten, General Manager, Patten Tractor & Equipment Co., Chicago, Ill., has been appointed a member of the Associated Equipment Distributors Board of Directors, to succeed his brother B. C. Patten, who resigned to affiliate with a government agency.



Army Needs Officers For Technical Units

In spite of announcements in the newspapers that few civilians will get Army commissions, there is still an opportunity for men over 35 years and even in the early 50's to secure commissions. The Army has set up an Officer Procurement Branch, United States Army, in over 30 principal cities to interview and process men for commissions in various branches where the Army needs highly skilled technical civilian experience in the fields of mechanical, electrical, and civil engineering.

Men who have not been deferred by Selective Service on occupational grounds, who are not in Class 1A, and who are physically qualified may apply by letter giving their age, draft status and experience. Men who are in executive and administrative positions are desired particularly.

If your local telephone directory does not show the address of the Officer Procurement Branch, U. S. Army, send your letter, giving the information required, to Officer Procurement Branch, U. S. Army, 42 Broadway, New York City, where it will be handled expeditiously and, if acceptable, the office nearest to you will arrange for an interview.

Engineer's Salaries

In the Public Service

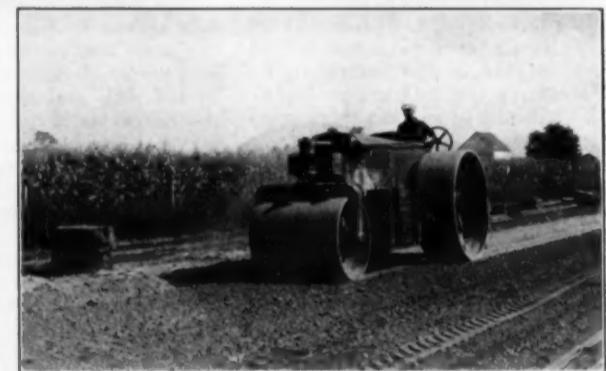
The Ohio Society of Professional Engineers in 1941 completed a survey of the salaries of engineers in public employment. The results of this survey, which covers state, county and municipal employment, with civil service definitions and graphs, have been published in a 34-page booklet which will be of considerable interest to many engineers employed by governmental agencies.

The price of the booklet is \$1.00 and it may be secured from the Society at 63 So. High St., Columbus, Ohio.



SOIL-CEMENT PAVING

Steps in the first soil-cement highway job in Indiana. (See page 30.) Starting at the top and reading left to right, the photos show: emptying the cement bags in two parallel rows; the Flynn Road Builder mixing cement and aggregate; compaction by a double sheepfoot roller pulled by a D7; a Farmall tractor pulling an Oliver spike-tooth harrow and wire broom drag working up a mulch of the top 3 inches; a Buffalo-Springfield roller on its first pass; a light fog of water after the first rolling; and placing hay for the cure. C. & E. M. Photos



Worn Parts Repaired To Outlast the New

Today every contractor and highway department knows that it is not only difficult to get replacement parts but sometimes practically impossible. However, it is possible to salvage worn tractor rollers and other tractor parts by hard-surfacing with proper alloys.

A new 16-page bulletin "Pointers on Rebuilding and Hard-Facing Construction Equipment" recently issued by Stoody Co., 1134 W. Slauson Avenue, Whittier, Calif., tells how to rebuild tractor parts and other types of construction equipment with Stoody Self-Hardening alloys. Stoody reports that tractor rollers rebuilt with Stoody rod outlast new unprotected rollers two to one and

in many cases the ratio is higher. This hard-surfacing operation can be repeated as often as necessary, so that tractor parts that were formerly scrapped after a few weeks of service can now be made to last months or even years.

A copy of the new "Pointers" bulletin will be sent free upon request to readers of CONTRACTORS AND ENGINEERS MONTHLY by writing direct to Stoody and mentioning this review.

Chain Belt Officer Dies

Frank J. Weschler, Vice President, Chain Belt Co., Milwaukee, Wis., and General Manager of Baldwin-Duckworth, a Chain Belt Division, at Springfield and Worcester, Mass., died sud-

denly on November 10 at Worcester, Mass. He had been exceedingly active in the industrial life of Springfield and Worcester, having started his activities there in 1902 with the bicycle industry.

In 1906 he became affiliated with the Hendee Mfg. Co., now the Indian Motorcycle Co., as Sales Manager. In 1927 he joined the Baldwin Chain & Mfg. Co. of Worcester, Mass., as President and Treasurer. When that company merged with the Duckworth Chain & Mfg. Co. in 1930, he became Treasurer and General Manager of the newly formed Baldwin-Duckworth Chain Corp. When Baldwin-Duckworth merged with the Chain Belt Co. in 1939, Mr. Weschler was made Vice President of Chain Belt Co., and General Manager of Baldwin-Duckworth.

Emergency Wood Pipe And Where to Use it

A helpful 8-page booklet, P.O. 32, on Armco emergency wood culvert pipe with numerous illustrations and a complete table comparing various sizes and thicknesses of emergency wood culverts with the standard corrugated-metal culverts as well as Armco emergency wood arches for larger drainage structures, has been issued by Armco Drainage Products Association, Middletown, Ohio. The booklet also includes an informative table of comparative weights of pipe and critical materials required for culvert service.

Copies of Booklet P.O. 32 will be supplied promptly by Armco to those writing direct and mentioning this item.

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CABLE CONTROL,
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Tractor Equipment



R-B Graders



Road Wideners



Spreaders



Oil-Mat Surfacing On Lincoln Highway

Another 15 Miles Added to Wyoming Strategic Network By Big Horn Construction Co. In 1942 Contract

(Photos on page 56)

FOR the past three years Wyoming has steadily pushed its program of widening and resurfacing the 440 miles of U. S. 30, the Lincoln Highway, across the state. A contract running east, and starting 15 miles from Cheyenne, completed in the summer of 1942, added another 15.635 miles to the nearly 200 miles of this route which has been widened to a 40-foot grade with a 34-foot oil mat of 2 inches compacted thickness and a chip seal 24 feet wide. The chip seal, somewhat lighter in color than the oil mat which extends 5 feet on either side of the seal, tends to concentrate traffic in two 12-foot lanes, as the uninitiated motorist or truck driver looks upon the oil mat at either side as shoulder and, wary from experiences in other states with soft shoulders or shoulders that were below the grade of the roadway, stays away. This extra width gives greater stability to the roadway surface and is insurance against edge failures. It also provides a strip for parking vehicles which have become disabled.

The contracts awarded to the Big Horn Construction Co., of Sheridan, Wyo., for surfacing this section of the Lincoln Highway, a part of the strategic network in Wyoming, were SN-FAP-138B(3) 1942 for 10.258 miles and SN-FAP-138D(4) 1942 for 5.377 miles. These had been graded in 1941 as Projects SN-FAP-138B(2) 1941 and SN-FAP-138D(3) 1941, respectively, by Blanchard Bros. of Cheyenne, Wyo. The grading and laying of the mat were completed in the autumn of 1941 and the seal placed in the spring of 1942.

Base Course

The base course is of pit-run gravel with a maximum size of 1-inch gravel and with not more than 20 per cent passing a No. 4 screen. It was laid down as a grading item 5 inches thick at the edges and 3½ inches thick at the center for a

40-foot width. The slope of the bottom of the base course was specified as 0.34 inch per foot.

The Oil Mat

The base course was primed with 0.5 gallon per square yard of MC-1 for the full 40 feet before the start of the work on the oil mat. Then sufficient crushed gravel with a sieve analysis as follows was windrowed at the side of the road for the mixing operation: 100 per cent passing a ¾-inch sieve, 70-100 per cent passing a ½-inch sieve, 45-75 per cent passing a No. 4 sieve, 35-60 per cent passing a No. 10 sieve, and 5-10 per cent passing a No. 200 sieve. Wyoming specifications forbid the placing of the windrow more than 4 miles ahead of the mixing operations, or more than a



C. & E. M. Photos
On left, a completed oil mat on U. S. 30 east of Cheyenne, Wyo., showing, from right to left, the untreated gravel shoulder, the double-primed base, the unsealed oil mat, and the chip seal which is also shown on the right. The scale lying on the chip seal is square inches.

week ahead of the start of mixing operations, for the protection of the traveling public.

The material in the windrow was mixed by a Barber-Greene traveling

plant, using 4 per cent of MC-3 by weight. This was spread by graders in a 2-inch layer to the required slope of ¼ inch per foot from the center line of

(Concluded on page 20)

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case w
breaka
and sm

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Photo courtesy U. S. Bureau of Reclamation

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- ★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

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FOR ALL CONTRACTORS' EQUIPMENT



TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

Snow-Plow Flashers Aid Winter Traffic

Snow plows must operate under the most hazardous traffic conditions, in storm and under cloudy skies, and frequently the machines pushing them are coated with snow, making them practically invisible to traffic coming up behind. Every effort should be made to increase the safety of traffic and to protect the snow plows, trucks and personnel from damage and injury. Auto Gear & Parts Co., 1410 W. Hunting Park Ave., Philadelphia, Pa., makes the Keystone snow plow light, which flashes a warning "Stop" in red through two big 6½-inch heavy-duty lenses with two individual flashes and lamps, to aid in this safety campaign.

These flashers mounted on top of the cab warn all traffic, both front and rear. The entire unit is mounted in a black enamel rust-resisting lead-coated steel case with the lenses cushioned against breakage and sealed to keep out rain and snow. A latch screw which will not

fall out holds the lenses securely in place. The reflectors are specially designed for maximum light output and are chrome-plated to resist rust and corrosion.

Complete information and prices of Keystone snow-plow lights may be secured direct by the manufacturer by mentioning this item.

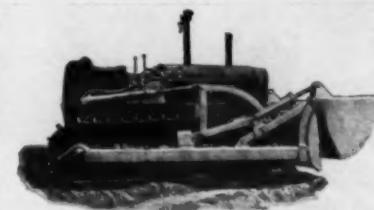
Bruce Gregory Promoted

Bruce Gregory, formerly in charge of sales for the Thornton Tandem Co., Detroit, Mich., has been made Vice President in Charge of Sales and a member of the Board of Directors. Mr. Gregory graduated from the University of Michigan in 1926, immediately joining the Sales Department of Firestone Tire & Rubber Co. After 2½ years, he was with the General Tire Co. for over nine years as Central Divisional Sales Manager, from which position he resigned to become associated with Thornton Tandem Co., manufacturer of four-rear-wheel-drive truck units.

A New Dirt Handler Mounted on Tractor

A new utility accessory for tractor mounting, which handles most types of smaller shovel jobs and can be used as a bulldozer or as a scraper, has recently been developed by the Hi-Way Service Corp., 3841 W. Wisconsin Ave., Milwaukee, Wis. This Drott Bull Clam shovel is hydraulically controlled from the driver's seat and can be used to dig, carry or float material. The depth of the cut is regulated by the raising and lowering of the clam.

By moving the outfit forward, the dirt is scooped into the shovel, leaving a smooth footing for the tractor. Either end of the Bull Clam may be tilted independently 24 inches for bank cutting from the driver's seat while the tractor is in motion. The manufacturer states that this unit can do many other jobs in addition to regular cut and fill, such as the removal of trees and stumps and carrying them to a disposal area, hauling big boulders, snow or ice, breaking open



The new Drott Bull Clam.

drains and laying pipe, tile or cable lines. By keeping the clam wide open, the outfit may be used as a bulldozer, without obstructing the operator's view.

Available in various sizes, the Bull Clams are made to fit all makes and models of tractors and have heaped capacity ranges of 1 to 4 cubic yards. The lifting capacity is from 3,000 to 12,000 pounds. Objects or material may be carried as high as 3 feet above ground, and the scoop may be dropped to 1 foot below ground level.

Full information on the Bull Clam may be obtained from the manufacturer by mentioning this descriptive text.

TARPAULINS

Shipped Immediately NO PRIORITIES NECESSARY*

Now you can phone any of the Distributors listed at the right — order any of the tarpaulins in sizes and brands listed below — and, unless there has been an unusual demand for the particular item you specify — YOUR ORDER WILL BE SHIPPED IMMEDIATELY...

*This fortunate condition is due to the fact that a large stock of tarpaulins has been made up from released goods and is awaiting your call.

BEAVER BRAND EXTRA

7.50 OZ. BEFORE WATERPROOFING

16 OZ. AFTER

WATERPROOFING



STOCK SIZES	
6 x 8	12 x 14
8 x 10	15 x 20
10 x 12	20 x 20

ALL THE ABOVE BRANDS TREATED
WITH GENUINE PARA WATERPROOFING

DEERSKIN BRAND EXTRA

10 OZ. BEFORE WATERPROOFING

18 OZ. AFTER

WATERPROOFING



STOCK SIZES	
8 x 10	12 x 14
10 x 12	12 x 18
10 x 14	15 x 20
10 x 16	20 x 20

MULEHIDE BRAND EXTRA

12 OZ. BEFORE WATERPROOFING

20 OZ. AFTER

WATERPROOFING



STOCK SIZES	
12 x 16	
14 x 16	18 x 24
15 x 20	20 x 20



For floor-by-floor protection on jobs like this, tarpaulins keep cold out, heat in.



For over-all protection, tarpaulins may be suspended from temporary framework.



Keep vital construction materials well protected. Avoid loss and costly delays.



ALABAMA

Owen-Richards Co., Birmingham

ARIZONA

O. S. Stapley Co., Phoenix

CALIFORNIA

Industrial Equipment Co., Oakland

CONNECTICUT

Gesner Equipment Corp., Hamden

DISTRICT OF COLUMBIA

Hudson Supply & Equipment Co., Washington, D. C.

ILLINOIS

Becker Equipment & Supply Co., Chicago

Joseph Behr & Sons, Rockford

Clark & Barlow Hardware Co., Chicago

INDIANA

Standard Equipment & Supply Co., Hammond

Van Camp Hardware & Iron Co., Indianapolis

IOWA

Harry Alter & Sons, Davenport

Pecaut Industrial Supply Co., Sioux City

LOUISIANA

C. T. Patterson Co., Inc., New Orleans

MARYLAND

General Supply & Equipment Co., Baltimore

MASSACHUSETTS

Hedge & Mattheis Co., Boston

Parker-Danner Co., Boston

MICHIGAN

Eddy & Cuthbert, Lansing

C. L. Granden & Co., Detroit

MINNESOTA

Equipment Rental & Sales Corp., Minneapolis

Thorman W. Rosholz Co., Minneapolis

MISSISSIPPI

Contractors Material Co., Jackson

MISSOURI

Brown-Strauss Corp., Kansas City

Machinery & Supplies Co., Kansas City

The Victor L. Phillips Co., Kansas City

NEBRASKA

Anderson Equipment Co., Omaha

NEW JERSEY

Dale & Rankin, Inc., Newark

NEW MEXICO

Chas. Ilfeld Co., Albuquerque

NEW YORK

Keystone Builders Supply Co., Rochester

New & Used Equipment Co., Long Island

Syracuse Lumber Co., Syracuse

OHIO

Trevor Corp., Buffalo

J. H. Welch Company, Inc., Buffalo

R. B. Wing & Son Corp., Albany

NORTH CAROLINA

Contractors Supply Company, Inc., Durham

Contractors Service Co., Charlotte

OKLAHOMA

Beck Supply Co., Columbus

Construction Equipment Corp., Cincinnati

Moriarty Machinery Co., Toledo

The W. T. Walsh Equipment Co., Cleveland

OKLAHOMA

The Victor L. Phillips Co., Oklahoma City

Mideke Supply Co., Oklahoma City

OREGON

Woodbury & Company, Portland

PENNSYLVANIA

Austin Supply Co., Philadelphia

Dravo-Doyle Co., Pittsburgh

Howard W. Read Corp., Philadelphia

VIRGINIA

Noland Company, Inc., Newport News

Benj. T. Crump Co., Inc., Richmond

WEST VIRGINIA

West Virginia Tractor Equipm't Co., Charleston

WISCONSIN

Hunter Tractor & Machinery Co., Milwaukee

H. WENZEL TENT & DUCK
ST. LOUIS, MO.





A Cedarapids Master Tandem crushing and screening plant in California.

New Portable Plant For Gravel or Rock

A newly designed portable crushing plant for gravel or rock, with no chains or sprockets in the drives, is being produced by Iowa Mfg. Co., Cedar Rapids, Iowa. This Cedarapids Master Tandem is designed for low-cost production of aggregate and requires no disassembly for transporting on its own wheels. Its low height and 8-foot width permit moving it as one compact unit from job to job.

A 30-inch x 50-foot feed conveyor with swivel attachment delivers the material to a box which feeds it to a 48-inch x 12-foot double-deck horizontal vibrating screen. Material passing the decks goes to the sand and rock delivery conveyors. The sand conveyor is an 18-inch x 20-foot unit while the portable delivery conveyor is a 30-inch x 50-foot steel lattice-type unit. Oversize from the top deck is delivered to a 10 x 36-inch jaw crusher, equipped with SKF self-aligning anti-friction bearings. Oversize from the second deck goes direct to a 40 x 20-inch roll crusher. Material from both crushers falls onto a 24-inch x 14-foot conveyor which carries it to the Raff wheel which raises the material to a 24-inch x 25-foot return conveyor carrying the material back to the vibrating screens.

The Cedarapids Master Tandem portable crushing plant is described in an 8-page Bulletin No. MT-1 which carries diagrams, specifications and illustrations of installations, as well as of the separate

parts of the plant. Copies of this bulletin will be supplied by the manufacturer upon request to those mentioning this item.

Manufacturers Unite To Build S. A. Trade

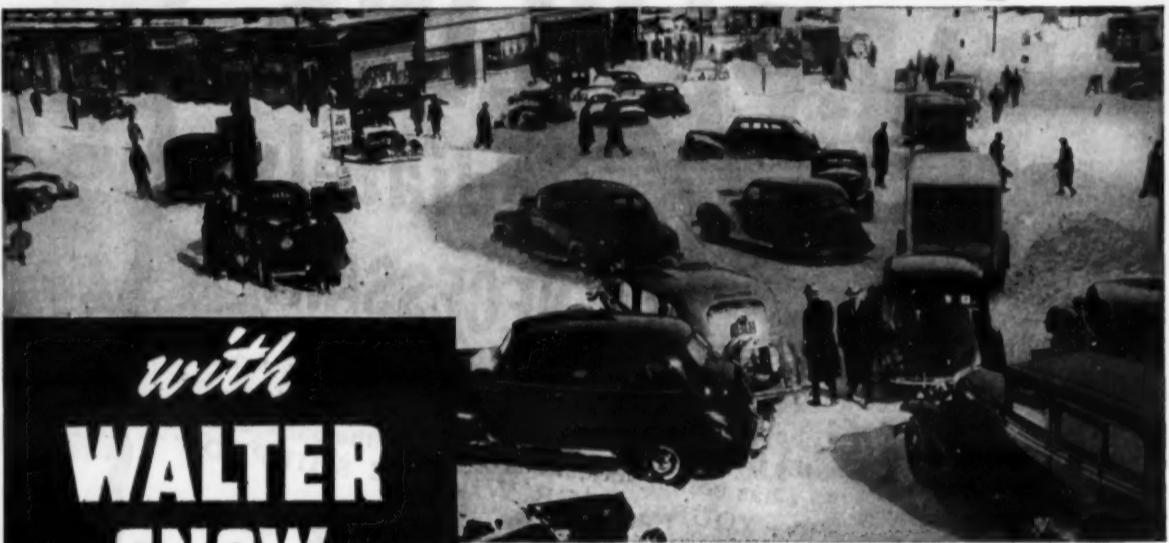
Excellent business possibilities with the Latin-American countries after the war is won are anticipated by three western companies who believe that, with proper development now, a market can be established there for equipment and materials produced in the United States. The Willamette Hyster Co. and Electric Steel Foundry Co. of Portland, Ore., and the Pacific Bridge Co. of San Francisco, Calif., have engaged Samuel Haskell of Buenos Aires to carry on development work in their fields in South America.

Mr. Haskell, born in Bay City, Mich., of American parents, has resided abroad, chiefly in Buenos Aires, Argentina, and in Bogotá and Cartagena, Colombia, for most of the past twenty years. He has been engaged in exploration work in connection with oil production and while with the Andean National Corp., Ltd., in Colombia he had charge of certain phases of the construc-

tion of a 356-mile 10-inch pipe line from El Centro to Cartagena, Colombia. For fifteen years he served as Manager of The Texas Petroleum Co.

Traveling mostly by air, Mr. Haskell has, in the past three-year period, made two complete circuits of the South American continent. He recently made a 2-month visit to the United States to confer with the firms he represents and to visit many jobs on which their products are used. He feels that a market can be established in Latin America for the Hyster tractor equipment and industrial trucks manufactured by the Willamette Hyster Co. and for the Esco steel products of the Electric Steel Foundry, and also that the construction program certain to follow the war will offer many opportunities for the engineering and construction service of the Pacific Bridge Co. The companies feel that this will go far toward keeping their expanded facilities busy and provide employment for their increased personnel after the war when business returns to a peace-time basis.

Prevent Traffic Paralysis



with WALTER SNOW FIGHTERS

Walter Features:

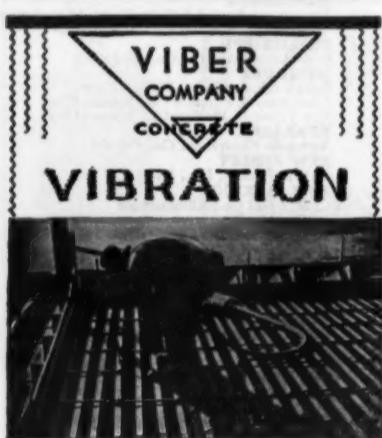
Automatic Lock Torque Propor-
tioning Differentials.
Suspended Double Reduction
Drive with less unsprung
weight, larger gear capacity
and higher ground clearance.
Tractor-type transmission, 10-
to-1 range, with 6 forward
speeds, 2 reverse, powerful
low gear, fast high gear,
single lever control.

A NY traffic tieup in your community this winter can stop the flow of arms, men and military supplies on the very day they are needed most. Be on your guard against traffic paralysis. Fight snow and ice to a finish with snow removal equipment specially designed for the job . . . **WALTER SNOW FIGHTERS.** With the super power and extraordinary four-wheel traction of Walter 4-Point Positive Drive behind your plows, the worst blizzard is quickly brought under control. This unfailing power-plus-traction gives Walter Snow Fighters their great blasting force through towering drifts and their steady, sure-footed drive on hard-packed or icy surfaces.

Walter Snow Fighters are available in many models, equipped with various types of plows and levelling wings, plus Walter Center Scraper, to meet the needs of every winter condition. Write for detailed literature.

WALTER MOTOR TRUCK CO.

1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y.



MOST PROFITABLE FOR REINFORCED CONCRETE BUILDING CONSTRUCTION

When the job calls for mass vibration the Viber Vibrator at work above is your best bet. Especially made for walls over 10 inches thick, foundations, large girders, thick floor slabs, columns . . . large reinforced concrete bridges, grade separations, concrete floor systems, concrete arches and rigid frame structures . . . In a word, for all concrete with large aggregate and low water-cement ratio.

Write for complete VIBER data TODAY!

VIBER COMPANY
726 So. Flower
BURBANK, CALIF.

Accounting System Of Minnesota County

Depreciation Account and Daily Labor and Equipment Reports Aid Lac qui Parle To Work on Small Budget

By LYLE W. PANTZKE, County Highway Engineer, Lac qui Parle County, Minnesota

LAC QUI PARLE County in Minnesota is located in the west central part of the state, bordered by the Minnesota River on the north and east, South Dakota on the west, and Yellow Medicine County on the south. It is 767 square miles in area, with a generally rolling topography and a heavy black loam soil. The Yellow Bank and Lac qui Parle Rivers run through the county, and are interspersed by numerous creeks and streams formed by water sheds from the Dakota hills, the water flow being generally to the northeast, into the Minnesota River.

The Lac qui Parle County Department of Highways, under the supervision of Lyle W. Pantzke, County Highway Engineer, is located at Madison.

Roads and Bridges

There are 469.82 miles of graded and gravelled roads in the county highway system and 55 bridges over 20 feet in length on these roads. All of the grading and the construction of the larger bridges are done by contract, with all county work carried out under Minnesota State Highway Department standard specifications.

Practically all of the smaller bridges have been erected by a county bridge crew, which for the past ten years has been given steady work the year round, erecting and repairing bridges and taking care of miscellaneous maintenance. An old four-wheel-drive truck was converted into a pile-driving unit for the bridge work, equipped with a winch driven from the power take-off. Piling up to 40 feet in length can be handled by this outfit.

Lac qui Parle County has erected many treated-timber bridges, which have been found to be very practical, easy and economical to build and maintain.

Purchases and Records

A feature of the Lac qui Parle County Highway Department organization is its highway accounting system which has had many favorable comments and meets with the approval of the Public Engineers Department.

Post-card records on all labor and equipment time are sent into the office at Madison regularly, the card indicating the exact nature of the work, the time required by the equipment at work each day, the amount of material used, and the time laid up for weather or repairs, if any. There is also a space for a record of the amount of gasoline and oil used for each day's work. This information is then transferred to monthly distribution sheets and these summaries entered at the end of each month in the Road and Bridge and Equipment

Ledgers. Data on equipment operation or any maintenance and construction costs are thus readily available at any time, as well as in suitable form for the annual report of the Department. A complete inventory record of all road equipment, including the valuation of all county highways, amounting to \$1,666,752.05, is also kept. The annual budget for the Highway Department for the past five years has averaged \$104,000.00.

The purchase order system, which has been in operation for a number of years, has been of great assistance in the accounting system. All equipment operators and foremen are authorized to sign purchase orders which are sent to the Department office. All purchases of materials and repairs amounting to more



A triple-span 25-foot bridge with concrete deck and treated-timber substructure in Lac qui Parle County, Minnesota.

than \$5.00 and which do not require legal action by the County Board are approved by the County Highway Engineer before payments are made. At the end of each month the original purchase orders are attached to each bill, sent to the vendors for their signature, and returned to the Engineer's office to be submitted to the County Board for payment. These bills are distributed in the ledgers in the same manner as the labor and equipment time. Purchases requiring legal action by the Board are for items

valued at \$500.00 or more and must be advertised and let under contract by the Board. The purchase of gasoline is rotated among the dealers in the county.

Garages

Lac qui Parle County has four garages to house its equipment. The central garage, where all of the major repair work is done, is located at Madison, with the other three in locations throughout the county to fit in conveniently with

(Concluded on page 36)

CALLING ALL CONTRACTORS AND OPERATORS!

Enlist

TO CONSERVE CONSTRUCTION EQUIPMENT

Show others that you are helping to make your equipment last longer and work faster. Regardless of the type or make of your equipment, if you will sign and mail the pledge form below, we will send you a colorful red, white and blue emblem to put on your machine (or it can be used on a truck or passenger car). Then it's up to you to practise what you have pledged—it's one big way you can contribute to victory.

PLEDGED

**CONSTRUCTION
EQUIPMENT
CONSERVATION**

*Get
This Emblem
Sign
This Pledge*

THE THEW SHOVEL COMPANY, Lorain, Ohio

I hereby pledge that I shall do all in my power to prolong the life of any construction equipment in my ownership or care regardless of type or make.

I realize that it is my responsibility to avoid time-consuming delays caused by mechanical breakdowns and will see that frequent inspections are made and that necessary adjustments and repairs are promptly taken care of.

I will avoid waste of parts and materials and will eliminate any abuse of my equipment due to non-recommended operation.

Signed _____

Street Address _____

City _____ State _____

"FIX-IT" Handbook Wanted _____

Lorain Model No. _____ Serial No. _____

COMPLETE WELL POINT SYSTEMS

WILL DRY UP ANY
EXCAVATION

Faster—More Economically

Write for Job Estimate and Literature

COMPLETE

MACHINERY & EQUIPMENT CO., Inc.

Dept. C
36-40 11th St., Long Island City, N.Y.

Tel. IRonsides 6-8000

"FIX-IT" HANDBOOK for LORAIN OWNERS

To assist our customers in keeping their machines in operation, we have just prepared a 24-page handbook of suggestions and ideas on how emergency repairs may best be accomplished. Indicate on the pledge form if you want us to send you a copy.



Hitting the Snows On Colorado Roads

**Truck Plows and Rotaries
Keep Roads Open; Problems
Vary in Mountains; Crews
Act on Own Initiative**

(Photos on page 56)

CREWS trained for their jobs, who know what to do, and when, make up the active fighting units on the snow front in Colorado. When snow comes, they need not wait for orders or equipment; they are prepared and know what to do—and most important—they do it!

The state is divided into seven Maintenance Divisions, each under an Assistant Superintendent of Maintenance. The roads are divided into patrols which average 22 miles in length but vary, according to the severity of maintenance conditions, from 14 to 28 miles. The patrolman and helper on each patrol section report directly to the Assistant Superintendent of their Maintenance Division. That is all very well from late spring to early autumn, but when winter snows hit Colorado roads, hundreds of miles of which are in the mountains, a shift in striking power is necessary. For the mountain passes, additional equipment is sent out in the autumn to the state camps built to house men and equipment. In Wolf Creek Pass in one winter there was 961 inches of snow, but the crew assigned kept it open. It is at an elevation of 10,850 feet and is on U. S. 160 across the southern edge of the state.

Truck Plowing

The motto in Colorado for plowing is, "Start with the snow; you don't know what it may do later". Truck plows make up the bulk of the fast hard-hitting snow fighting army. Both blade and V-plows are used on all-wheel drive trucks in the winter and the trucks are used for hauling gravel and pre-mix for road repairs the remainder of the year.

A simple and very effective improvement in the truck plows was developed in the Colorado equipment shops. It consists of a pair of 6-spoke 16-inch-diameter steel wheels with roller bearings and hard rubber tires 4 inches wide

which were made by Firestone specially for this service. These wheels, which are swiveled, take the place of the usual steel shoes which wear so rapidly and sometimes are the cause of plows bucking and breaking the frames on the front of the trucks. The wheels are affixed to brackets welded to the backs of the plows and are adjustable by hand screws for any desired height above the surface of the roadway. The two wheels are tied across the center by a rod with turnbuckles so that they swing together when turning, making the assembly more stable and free from wobble.

Rotaries—Cutters—Wings

Drifts and high piles of plowed snow offer problems that ordinary truck plows cannot attack. For these services the



Colorado State Highway Dept. Photo
Widening out a mountain highway with a Rotoblade mounted on an Oshkosh truck.

Colorado State Highway Department has a 3-auger Snogo rotary plow with a 275-hp motor for the fan and augers and a 175-hp motor on the engine. This is used primarily for opening the highest passes where the snow has blocked

the road for most of the winter, and for widening the roadway where it has become narrowed by the constant plowing of snow from the center so that traffic could get through.

(Concluded on page 43)

MADSEN Twin-shaft PUG MILL MIXERS



The most important equipment embodied in an asphalt plant is the Mixer. No other part of the plant suffers the hour-after-hour grinding punishment which this unit must withstand. The Madsen Pug Mill Mixer built for production of asphaltic-bound mixtures assures you dependability, economy and outstanding production.

A faster mix and a faster discharge—ease of replacement and simplicity of construction—all are features of the Madsen Pug Mill Mixer.

MADSEN
IRON WORKS
HUNTINGTON PARK, CALIFORNIA

REPLACEMENTS

are as big a problem *at home* as at the Front. For avoidance of replacement problems and preventable overhaul lay-offs in the **CONSTRUCTION** field use . . .

... SINCLAIR PENN-SYLVANIA and OPA-LINE MOTOR OILS,
Sinclair specialized gear oils and greases. These lubricants give protection that keeps wear negligible and promotes delivery of full designed output from heavily worked equipment.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

2540 WEST CERMAK ROAD
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KANSAS CITY

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ATLANTA

FAIR BUILDING
Ft. WORTH



STO

How to get MAXIMUM SERVICE LIFE from Construction Equipment with Stoody Hard-facing Alloys

WEARING PARTS on construction equipment can be made to last indefinitely by protecting areas exposed to abrasion with Stoody Hard-facing Alloys. A hard-faced part usually outlasts an unprotected part three to ten times. Furthermore, the hard-facing application can be repeated as often as necessary—thus one part can be made to do the work of ten to twenty ordinary steel parts. The importance of these applications can

not be over-emphasized under present conditions when the time element is so important and new parts so difficult to obtain.

This chart shows the accepted procedure for hard-facing common types of construction equipment and the type of rod recommended for each particular application. More specific information can be obtained on these and other applications by writing Engineering Dept., Stoody Company, Whittier, Calif.

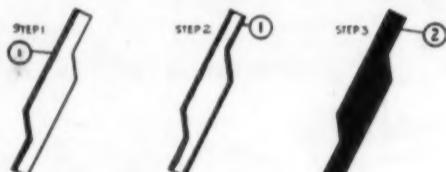


② Stoody Self-Hardening

TRACTOR GROUSERS

Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening. To rebuild worn grouzers place bar of builder's reinforcing steel (see arrow) on worn grouser cleat. Weld bar to the grouser with Stoody High Carbon. Protect cleat against abrasive wear with a single pass of $\frac{1}{4}$ " Stoody Self-Hardening. The sketch at left illustrates the operation.

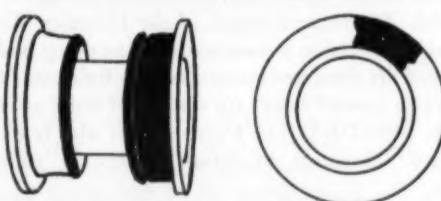
New grouzers should be hard-faced with a single layer of $\frac{1}{4}$ " Coated Stoody Self-Hardening as shown in the sketch at right. The $1\frac{1}{2}$ " spaces between the deposits eliminate danger of cracking.



① Stoody High Carbon
② Stoody Self-Hardening

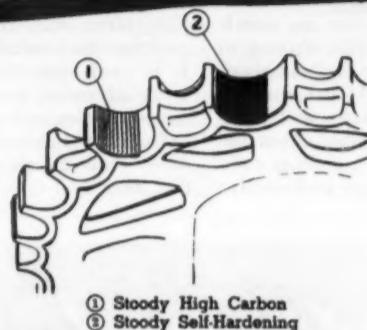
TRACTOR TRACK RAILS

Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening. Hard-facing is limited to rails that can be rebuilt to size with a single layer of Stoody Self-Hardening. Lay track out on floor or bench. If track is from large tractor apply guide bead of Stoody High Carbon to one side of twelve rails. (See step 1.) Return and apply guide bead to opposite sides. (See step 2.) A weaving pass of Coated Stoody Self-Hardening between the two beads of High Carbon completes the job. (See step 3.) Peen deposit of each rod vigorously while deposit is still at red heat. When job is completed check to be sure rail ends have proper clearance. If not, remove excess metal with cutting torch.



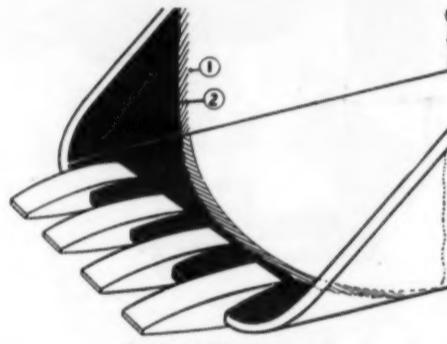
TRACTOR TRACK ROLLERS

Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening. Clean to remove oxides. If roller is single flange type apply guide bead around outer edge. Guide bead should be as thick as proposed build-up. Apply one or two layers of Coated Stoody Self-Hardening between guide bead and flange. Apply weaving bead to flange. Peen deposit of each rod. Some procedure applies to double flange rollers except guide bead is omitted. Grinding is unnecessary. The sketches illustrate the application.



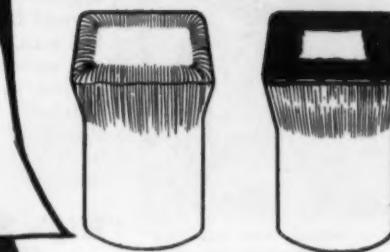
TRACTOR DRIVE SPROCKETS

Rebuild with $\frac{1}{4}$ " Stoody High Carbon. Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening. Run a shaft through the hub of the sprocket and set ends of shaft on saw horses so sprocket wheel can be easily turned during welding operation. Rebuild areas that are badly worn with Stoody High Carbon. Finish with single layer of Coated Stoody Self-Hardening. Apply beads transversely. Peen the deposit of each rod. The sketch illustrates the application.



BUCKETS

Rebuild with $\frac{1}{4}$ " Coated Stoody Manganese. Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening. Some concerns make it a practice to hard-face bucket lips, runners, and other areas receiving considerable wear before they are placed in service. Others permit sections to wear and then rebuild with Coated Stoody Manganese and apply a final layer of Coated Stoody Self-Hardening. Still others repair worn areas by welding in sections of old grader blades or scrap manganese plate with stainless steel electrodes. These plates are then overlaid with $\frac{1}{4}$ " Coated Stoody Self-Hardening. Deposits of both Stoody Self-Hardening and Stoody Manganese must be vigorously peened for best results. The sketch illustrates one method of rebuilding.



SHEEPSFOOT ROLL TAMPERS

Rebuild with $\frac{1}{4}$ " Stoody High Carbon. Hard-face with $\frac{1}{4}$ " Coated Stoody Self-Hardening.

If tamps are removable, construct a jig so that tamps can be slipped into position and rebuilt against a copper form. Rebuild tamps to original size and shape with Stoody High Carbon. (See sketch at left.) Apply final layer of Stoody Self-Hardening to protect tamps against wear. (See sketch at right.) Self-Hardening deposit should be peened while it is still at red heat.

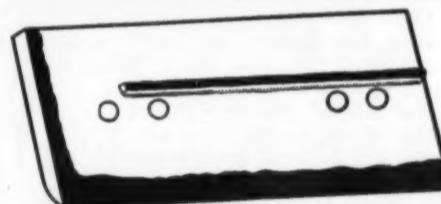
If tamps are stationary it is advisable to hard-face them with Coated Stoody Self-Hardening before they are placed in service. The hard metal deposit should be replaced as soon as it wears away to avoid rebuilding.



DITCHER TEETH

Hard-face with $\frac{3}{32}$ " 30-40 or 30-down Acetylene Tube Borium.

Sharpen in forge. Grind top side to remove oxides. Block up on bench so that area to be hard-faced will be level. The Tube Borium deposit need not extend more than $\frac{1}{2}$ " upward from point. The sketch illustrates the deposit.



BULLDOZER END PLATES (TIPS)

Hard-face with either $\frac{1}{4}$ " Coated Stoody Self-Hardening or $\frac{1}{4}$ " 20-30 Electric Tube Borium.

Place bulldozer tip in flat position and apply either Electric Tube Borium or Coated Stoody Self-Hardening, covering area indicated in the sketch. Where Stoody Self-Hardening is used, peen the deposit of each rod. DO NOT PEEN ELECTRIC TUBE BORIUM DEPOSITS.



STOODY COMPANY
Hard Facing Alloys

Black-Topping Roads At Ordnance Depot

**Speed the Need in Building
115 Miles of Plant-Mix;
Pit-Run Gravel from Site
For Base, Crushed for Top**

ALL but the asphalt came from the reservation where black-top roads were built for a mountain-state Ordnance Depot. Gravel of any character desired was available along a bench about one mile in length, but all locations gave an excess of sand. The base for the roads consisted of 6 inches of pit-run gravel, while the topping aggregate was crushed, stockpiled and then loaded into the pair of hot-mix plants. The speed of spreading was limited by another contractor in completing the gravel base.

The paved section of the main road of the Depot is 22 feet wide, while the road dividing the igloo areas is 18 feet and the side roads serving the igloos are 11 feet. On these 115 miles of roadway, a total of 165,000 tons of hot-mix was used to furnish all-weather service to and from the all-important storage facilities. On the 30-foot base of pit-run gravel for the main road is a surface gravel course 6 inches thick of maximum $\frac{3}{8}$ -inch stone which was cored out $2\frac{1}{2}$ -inches deep and 22 feet wide for the hot-mix top. These gravel courses were compacted by 10-ton steel wheel rollers.

Processing the Gravel

At a section of the gravel bank where the gravel gave the best gradation as pit-run material, the contractor set up a Cedar Rapids crushing and screening plant with a 10 x 36 jaw crusher and 20 x 30 rolls which were adjustable to produce maximum 1-inch crushed gravel for the hot-mix and maximum $\frac{1}{2}$ -inch chips for the seal. In the pit a Northwest 2-yard shovel loaded the fleet of shuttle trucks hauling to the crusher. Operating against a 10-foot face of the gravel bank, the shovel's production was very good, particularly as there was no waiting for trucks to load. The trucks dumped direct to the feeding hopper of the Cedar Rapids crushing plant which produced about 3,500 tons of the 1-inch material or 700 tons of the $\frac{1}{2}$ -inch chips in the 16-hour working day.

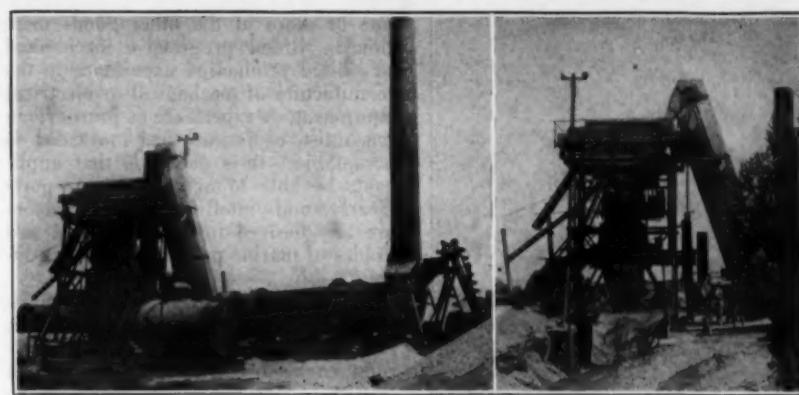
The Asphalt Plants

The two asphalt plants which were seldom operated at the same time were centrally located on a spur track on which the tank cars of asphalt were brought in. The asphalt storage facilities were rather unusual as "they" consisted of a single pit boarded up with planks. What asphalt went through the planking when the tank was first filled rapidly congealed and furnished a seal for the balance of the material. It had a capacity of 90,000 gallons and was equipped with heating coils to permit easy pumping by the Fairbanks reciprocating pump and a rotary pump which delivered the asphalt to the weigh box through a loop with a 3-way valve so that when not taking asphalt for the weigh box the material returned to the

asphalt sump.

The first of the two asphalt plants was a Union Tank plant which was fed the aggregate by a bulldozer from a stockpile. The material ran into a small boot from which the cold elevator picked it up and delivered it to the 6-foot diameter drier. The hot elevator picked up the dried material and delivered it to a rotary screen which separated the aggregates for the two sizes and dropped them into the four bins provided. The first bin group contained sand and $\frac{1}{2}$ -inch gravel while the second received the 1-inch and smaller material.

The weighed batches, including the asphalt, were dropped into the pugmill mixer and received a minimum 45-second mix. The plant operated two 8-hour shifts, producing 1,000 tons each shift.



C. & E. M. Photos
The two asphalt plants used to supply street paving material for a mountain-state Ordnance Depot, each of which produced 1,000 tons per 8-hour shift.

The operating crew consisted of the Superintendent, a tractor operator for feeding the cold elevator, one cold-elevator feed-control man, one oiler and one fireman for the steam boiler, one weigh man for aggregates and a mixer man for the asphalt and mixer dumping. The gates

were dumped by steam from the horizontal oil-fired boiler.

The second plant, a smaller unit, was a Madsen asphalt plant with a 2-ton pug mixer. It was fed in a manner similar to the other plant, by a bulldozer, and had

(Concluded on page 34)

Keep Your Horses Pulling on the Victory Road

You'll get the most efficient excavator performance when all the "horses" in your engine are pulling full strength. Here are a few hints that may help keep that engine humming.

- 1 Inspect engine regularly and keep it clean.
- 2 Warm a cold engine up slowly (don't use choke more than is absolutely necessary).
- 3 Don't stop a heavily loaded engine abruptly. Let it idle a little to cool off before shutting down.
- 4 Flush radiator out whenever water gets dirty. Be sure water added is clean. Never add cold water to an overheated engine.
- 5 Use good grade lubricating oil. (Follow manufacturer's recommendations). Clean sump and change filter element frequently (every other oil change is good practice).
- 6 Keep proper amount of water in battery. (Add water when starting, never when shutting down). Keep terminals covered with grease to avoid corrosion.
- 7 In gasoline engine, keep spark plugs and distributor points properly adjusted and clean.
- 8 In diesel engine, check injection nozzle pressures after 300 hours on a new engine, every 1500 hours thereafter. KEEP FUEL CLEAN. Storage tank and transfer containers or pumps should be kept free of both dirt and water.
- 9 Get complete care and maintenance instructions from manufacturer or distributor, and follow them carefully.



NEED A BIG Trailer?

La Crosse Makes Them
Up To 200 Ton Capacity
** WRITE OR WIRE **

LA CROSSE TRAILER & EQUIP. CO.
LA CROSSE, WISCONSIN U. S. A.

Bucyrus-Erie employees
have accepted the award
of the Army-Navy "E"
as a challenge to keep
production rising. **

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

Bucyrus-Erie

Enlarged reprints of this ad are available for your bulletin boards. In the reprints, the Bucyrus-Erie signature is omitted to leave room for your own name. Write for your copies.



Poster designed and produced by National Process Co., New York City

Volcanic Cinders Used for Road Base

(Continued from page 1)

tion for the operation of the fleet of hauling trucks which enter at grade and have only the hills outside the pit to negotiate.

A 2-yard and a 2½-yard shovel are working in the natural cinder pit, loading out an average of 2,181 cubic yards of material a shift to a fleet of trucks that is busy from dawn to night. The hauling fleet includes four 32-yard trailer trucks, six 4-yard light trucks, and sixteen 10-yard 10-wheel trucks.

The work of providing the necessary roads, widening old trails, and surfacing them for the hauling of the war material to be placed in storage on this reservation was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

Inspectors Needed For Ship Materials

The expanded facilities of the U. S. Maritime Commission in the construction of cargo and war-purpose ships and the production of materials for outfitting them has created a need for additional inspectors with industrial experience in the manufacture of metal, wooden, glass and other articles. Inspections must be made, at place of manufacture and at point of delivery, of metals, metal products, mechanical equipment, electrical equipment, hand tools, micrometers, gages, and a variety of portable mechanical equipment, machinery, or instruments. The United States Civil Service Commission will accept applications for such positions until further notice.

For positions paying \$2,600 a year, it is desirable that applicants show appropriate experience in the inspection, or testing for compliance with specifications, of this wide variety of electrical or mechanical equipment, in addition to

one or more of the other goods mentioned. Broad progressive mechanical or skilled production experience in the manufacture of mechanical or electrical equipment, or experience as journeyman machinist, or journeyman toolmaker is acceptable. It is desirable that applicants be able to make written reports clearly and intelligently. Inspectors are also desired for various types and grades of marine paints and paint products.

There are no age limits for these positions, and no written test is required. Applications are not desired from persons engaged in war work unless a change of position would result in the utilization of higher skills. War Manpower Commission restrictions on Federal employment of persons engaged in certain critical occupations in specified areas are given on Form 3989 posted in first and second-class post offices throughout the country.

Announcement No. 270 for Assistant Materials Inspectors of paints, textiles, or general equipment, and forms for

applying, are obtainable at first and second-class post offices. Applications must be filed with the United States Civil Service Commission in Washington, D. C., and will be accepted until the needs of the service are met.

Waterproofing Agent For Road-Mix or Hot-Mix

A direct understandable description of the Kotal method of waterproofing aggregate for bituminous paving, either hot-mix or road-mix, is found in a new folder "Kotal for the Engineer", written by Herbert P. Pearson, Technical Director of the Kotal Co. The first two pages of this folder tell just what Kotal is and what it does, while the last two pages are devoted to adequate testimony regarding its actual use under a wide variety of conditions.

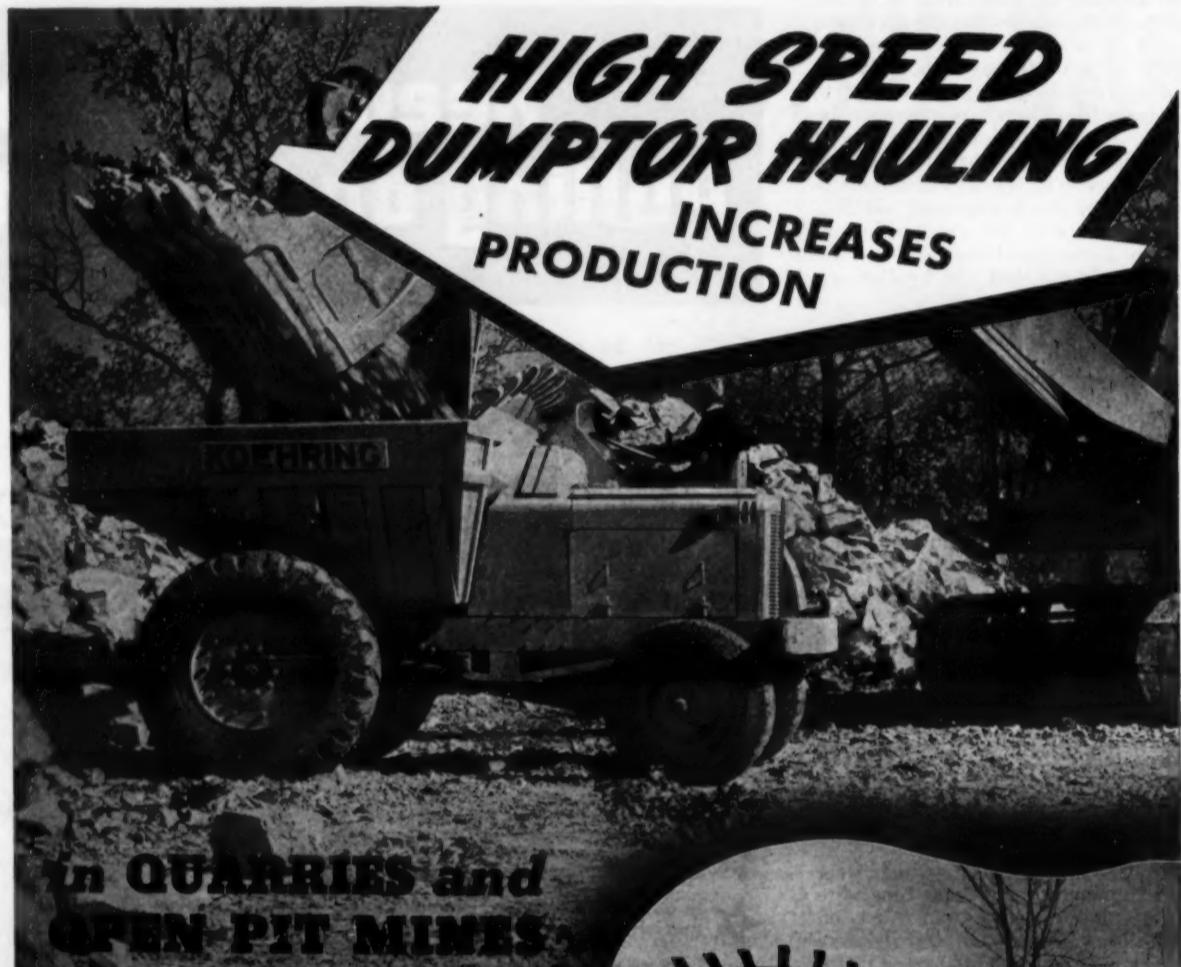
Copies of this folder will be sent promptly upon request addressed to Kotal Co., 52 Vanderbilt Ave., New York City, and mentioning this brief review.



HOBART Arc Welder's Greater Speed means quicker Victory!

"Simplified" means greater efficiency through longer hours of valuable service. Operators get peak performance during their entire shift with less fatigue. Remote Control gives correct "heat" regardless of distance work is from machine. Insures the right weld quality with no waste time. Many other Hobart speed-features. Investigate today.

Just \$2
brings you this NEW 1942 WELDING
BOOK on HOW you can GET
MORE out of your ARC WELDERS
Explains latest techniques, methods, equipment and materials. Complete book that'll pay you dividends. Order today.
HOBART BROS. Box CE-122, Troy, N. Y.
5 Days FREE Examination



in QUARRIES and

OPEN PIT MINES

Now, when speed is essential, it is necessary to do the job in the shortest possible time. In quarries and open pit mines the Koehring Dumptor has been accepted as a high speed, dependable hauling unit. Important time-saving advantages are **instantaneous** dumping, three speeds, either forward or reverse, easy quick loading, G. M. Diesel power, constant mesh transmission. The Dumptor travels either way eliminating turns and backing. The Dumptor does not need to wait for body hoisting. It dumps by gravity, **instantaneously**. Seconds saved in every operation, increases daily production.

KOEHRING CO., Milwaukee, Wis.



Saves Seconds Every Trip

Koehring Dumptor dumps **instantaneously** to cars, hopper, grizzly or fill.



HEAVY-DUTY CONSTRUCTION EQUIPMENT



STERLING
LIGHT PLANTS

BUILD FOR
DEFENSE
with
STERLING
PUMPS
HOISTS
and
LIGHT
PLANTS



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Keysto
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tools, p

A Lubrication Guide For Power Equipment

The main function of lubrication is to safeguard the investment in construction equipment and to make it operate more efficiently. A line of lubricants prepared for rugged service to insure low lubricating and maintenance costs has been developed by Keystone Lubricating Co., 21st, Clearfield and Lippincott Streets, Philadelphia, Pa. These Keystone lubricants, prepared for special service in air compressors and air tools, power excavating equipment, tractors, crushers, conveyors, dredges, diesel

and gasoline engines and motor trucks, are described in detail, with a statement of Keystone's 35-year-old guarantee, in the Sixth Edition of the Keystone ABC of Lubrication.

Copies of Volume 4 of the book, devoted to the equipment listed above, may be secured direct from the manufacturer by referring to this item.

Concrete Curing Data

The curing of concrete, particularly in highway and runway construction, has gone through the ponding, wet earth cover, and various stages of curing with

silicates, chlorides, and asphalt, as well as the use of burlap and paper, to the present use of curing compounds or membrane curing compounds.

The various types of curing methods are discussed in a matter-of-fact manner in an 8-page bulletin entitled "A General Discussion on Concrete Curing Compound and its Problems", issued by the Waterproofing Division, Battenfeld Grease & Oil Corp., Thirty Second & Roanoke Road, Kansas City, Mo. In addition, this same company has published a folder discussing the advantages of Satisfaction concrete curing compound, replete with illustrations and compari-

sons of concrete curing methods, and the results of test runs using this material according to various state highway specifications.

Copies of the booklet and the folder will be furnished to readers of CONTRACTORS AND ENGINEERS MONTHLY promptly upon request to Battenfeld by mentioning this review.

New LeTourneau Plant

On November 28, dedication ceremonies were held at the new plant of the LeTourneau Co. of Georgia, located at Vicksburg, Miss.

On a Sunday morning twelve months ago, America got out of bed and yawned and breakfasted, went to church and read the funnies or took a walk with the kids. We were a big, sleepy, good-natured people who only half believed that such things as war existed.

A few hours later we were awake. The thing that made us awake was treacherous and brutal, but the shock of it was as bracing as an icy shower. We knew, at last, where we stood and what we had to do.

THAT WAS A YEAR AGO...

You have a broad idea of what the nation has accomplished in this first year of war. We now report to you on what the men of one company have done and are doing.

Long before last December, "Caterpillar" Diesel Tractors and Motor Graders, Engines and Electric Sets were busy on what was then called "defense" work. With the country's entry into war, "Caterpillar" production was turned wholly to war purposes, and our plants, already working three shifts a day, stepped up their output of machines. Additional space was built. More workers were trained.

Throughout this crucial year, 100 per cent of this increased "Caterpillar" production has been going into the war effort — the vast majority of it directly to the combat forces of the Army, Navy and Marine Corps, and for our fighting allies. On all the world's battlefronts these machines are in the thick of the struggle for freedom. "Caterpillar" Diesel equipment is clearing beach-heads for attack troops, hauling big guns, building and repairing landing fields, drilling wells and pumping water. It is powering naval craft and generating current for lights and communications, afloat and ashore. But our report would be far from complete if it dealt only

with combat activities. Here at home, thousands of older "Caterpillar" machines have been performing what appears to be a miracle. With no new machines coming from the factory to replace them — with fewer men to do the vital wartime jobs, and with heavier loads and longer hours a necessity — they have stood up under grueling punishment, month after month. In industry and construction, in mines and lumber camps and on the farms, "Caterpillar" Diesels are making a mighty contribution to the war effort.

They're no orphans — these tough, veteran machines. They are under able and expert guardianship. Back of their record of performance stand the "Caterpillar" dealers who have met the challenge of this emergency with energy and courage, and have shouldered full responsibility for keeping "Caterpillar" Diesel equipment doing its sturdy best.

With a large supply of replacement parts, and with complete service facilities available night and day, "Caterpillar" dealers everywhere are pledged to keep "Caterpillar" Diesel Tractors, Graders, Engines and Electric Sets delivering all of the long life and rugged dependability that are built into them — until victory is won.

CATERPILLAR DIESEL

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

TO WIN THE WAR: WORK — FIGHT — BUY U. S. WAR BONDS!

Convertible Shovel Improvements Shown

A new 12-page catalog showing many of the improved design and construction details of the 1 1/4-yard LS-120 Link-Belt Speeder shovel-dragline-crane-pull-shovel, and giving complete information on clearances, dimensions, lifting capacities and specifications of this heavy-duty machine, has just been issued by Link-Belt Speeder Corp., 301 W. Pershing Rd., Chicago, Ill.

Included in the features of the LS-120 are all-welded unit construction instead of castings; self-aligning center pin bearings; self-aligning rotating rollers and a fully independent rapid boom-boist. Another outstanding feature is the pull-shovel attachment of the unit which permits deeper and more positive digging.

Copies of this Catalog No. 1943 replete with illustrations may be secured direct from Link-Belt by referring to this review.

Teel of Novo Dies

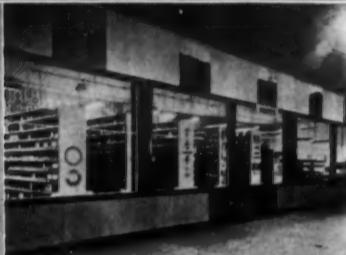
Eric P. Teel, former Vice President and General Manager of Novo Engine Co., Lansing, Mich., died at his home on October 24, 1942. He was prominent in various contractors' machinery manufacturers associations, having been chairman of the Contractors Pump Manufacturing Bureau. Mr. Teel was one of the original organizers of this group and acted as its chairman for a period of 3 years.

He joined the Novo Engine Co. organization in 1908 as Shop Superintendent and was elevated to the position of Vice President and General Manager in 1932 on the death of Clarence E. Bement, his predecessor.

Steel production for the Victory effort can not be maintained at the necessary peak unless every bit of idle scrap is turned in. Look through your yards and shops again—and start your scrap on its journey to Berlin or Tokyo.

Here's What We Mean by JAEGER SERVICE

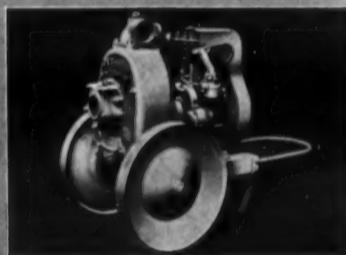
1: COMPLETE STOCKS OF REPAIR PARTS as near to you as your telephone.



3: STOCKS OF JAEGER "Sure-Prime" PUMPS and MIXERS for sale or rent, to meet the heavy winter need.



2: TRAINED MECHANICS, with factory shop facilities, to check, repair and maintain your construction and paving equipment in efficient working order.



4: DIRECT HELP ON YOUR PAVING PROBLEMS—for airports and strategic roads (concrete or bituminous) we offer experienced engineering counsel, knowledge of local conditions and latest type spreading and finishing equipment.

As Near to You as Your Telephone

ALABAMA
BIRMINGHAM, Gantt Machinery Co., Inc., Ed.
MOBILE, Turner Supply Company
MONTGOMERY, Ray-Brooks Machinery Co.

ARIZONA
PHOENIX, Smith-Booth-Usher Company

ARKANSAS
LITTLE ROCK, Choctaw Culvert & Mach. Co.

CALIFORNIA
LOS ANGELES, Smith-Booth-Usher Company
SAN FRANCISCO, Bacon Company, Edward R.

COLORADO
DENVER, Moore Equipment Company, H. W.

CONNECTICUT
EAST HARTFORD, Hedge & Mattheis Company
WEST HAVEN, Hedge & Mattheis Company

FLORIDA
JACKSONVILLE, Moody, M. D.
MIAMI, Llewellyn Machinery Corp.
TAMPA, Cameron & Barkley Co.

GEORGIA
ATLANTA, Armstrong & Bro. Company, R. S.

ILLINOIS
CHICAGO, Arrow Contractors Equipment Co.

INDIANA
FORT WAYNE, Pioneer Coal Company
HAMMOND, Standard Equip. & Supply Corp.
INDIANAPOLIS, Deaney, A. F.
SOUTH BEND, General Equipment Company

IOWA
DAVENPORT, Arrow Equipment Company
WATERLOO, Waterloo Construction Company

KENTUCKY
LOUISVILLE, Whayne Supply Company, Roy C.

LOUISIANA
NEW ORLEANS, Fletcher Equipment & Supplies
NEW ORLEANS, Southern States Equipment Co.

MAINE
BANGOR, Hedge & Mattheis Company
PORTLAND, Hedge & Mattheis Company

MARYLAND
BALTIMORE, John C. Louis Co., Inc.
BETHESDA, John C. Louis Co., Inc.

MASSACHUSETTS
BOSTON, Hedge & Mattheis Co.
WEST SPRINGFIELD, Hedge & Mattheis Co.
WORCESTER, Hedge & Mattheis Co.

MICHIGAN
DETROIT, Burke, Cyril J.
DETROIT, Schuster Equipment Co.
GRAND RAPIDS, Keller Tractor & Equip. Co.

MINNESOTA
DULUTH, Standard Salt & Cement Co.
MINNEAPOLIS, Minneapolis Equipment Co.

MISSISSIPPI
JACKSON, Choctaw Culvert & Mach. Co.

MISSOURI
KANSAS CITY, Bublits Machinery Company
ST. LOUIS, Allied Construction Equip. Co.

MONTANA
HELENA, Montana Powder & Equipment Co.

NEBRASKA
OMAHA, American Machinery & Supply Co.

NEW HAMPSHIRE
CONCORD, Hedge & Mattheis Company

NEW JERSEY
NEWARK, The Jaeger-Lembo Machine Corp.
RED BANK, Prather, Graffin S.

NEW MEXICO
ALBUQUERQUE, Harrison Co., R. L.

NEW YORK

ALBANY (MENARDS), Kelley Co., Inc. E. B.
BUFFALO, Rupp Equip. Co.
CORONA, L. I., Jaeger-Lembo
Machine Corp.
PLATTSBURG, Jerry, Vincent S.
ROCKVILLE CENTRE, L. I., Jaeger-Lembo
Machine Corp.
ROCHESTER, Syracuse Supply Co.
SYRACUSE, Syracuse Supply Co.

NORTH CAROLINA

RALEIGH, North Carolina Equipment Co.
STATESVILLE, North Carolina Equipment Co.

OHIO

AKRON, Hardware & Supply Company
CANTON, Figley Company, The W. K.
CINCINNATI, Highway Equipment Company
CLEVELAND, Pattison Supply Co., The W. M.
DAYTON, Flack Equipment Company
GALLIPOLIS, Bischoff, R. E.
HAMILTON, Miami Equip. & Supply Co.
TOLEDO, Flack Equipment Company
YOUNGSTOWN, Stambaugh-Thompson Co.

OKLAHOMA

OKLAHOMA CITY, Wylie-Stewart Mach. Co.

OREGON

PORTLAND, Nelson Equipment Company

PENNSYLVANIA

ERIE, John F. Steiner
HARRISBURG, Standard Equipment Company
PHILADELPHIA, Service Supply Corporation
PITTSBURGH, Highway Equipment Co.
WILKES-BARRE, Standard Equipment Co.

RHODE ISLAND

PROVIDENCE, Hedge & Mattheis Company

SOUTH CAROLINA

COLUMBIA, Bell-Lott Road Machinery Co.

TENNESSEE

CHATTANOOGA, Osborne Equipment Company
KNOXVILLE, Osborne Equipment Company
MEMPHIS, Choctaw Culvert & Mach. Co.
NASHVILLE, McCarthy, Jones & Woodard Co., Inc.

TEXAS

DALLAS, Browning-Ferris Machinery Co.
EL PASO, Tri-State Equipment Company
HOUSTON, Browning-Ferris Machinery Co.

UTAH

SALT LAKE CITY, Jones Equip. Co. The C. H.

VERMONT

BELLOWS FALLS, Hedge & Mattheis Company
BURLINGTON, Strong Hardware Company

VIRGINIA

LYNCHBURG, Branch, Marion S.
NORFOLK, Hampton Roads Tractor & Equip. Co.
RICHMOND, Smith-Courtney Company

WASHINGTON

SEATTLE, A. H. Cox & Company
SPOKANE, Nelson Equipment Company

WEST VIRGINIA

CHARLESTON, Capital City Supply Company
CLARKSBURG, General Equipment Co., Inc.
HUNTINGTON, Banks-Miller Supply Company
WHEELING, Seabright Co., H. L.

WISCONSIN

MILWAUKEE, Boehck Equipment Company

WYOMING

CHEYENNE, Wilson Equipment & Supply Co.

JAEGER
DISTRIBUTORS
IN OVER 100 CITIES
ARE "GEARED UP" FOR
WAR SERVICE



A Victory Speed sign in Ohio.

Victory Speed Signs In National Colors

Ohio was one of the first states to establish the 35-mile rate of speed by a proclamation of its Governor, and immediately thereafter to erect new "Victory Speed" signs. At present, there are 1,600 of the new signs on Ohio state highways, placed just outside the corporation lines of cities and towns to face outgoing traffic. Plans have been made to erect additional signs at intervals of approximately 7 to 10 miles.

The signs are made of a new tempered pressed wood, and measure 24 by 30 inches. The letters in the legend at the top "Victory Speed" are 4½ inches in height and the numerals "35" below are 10 inches in height. The upper half of the sign is red with white letters and the lower half is white with blue numerals. The sign is reflectorized by glass beads which are embedded in a coat of varnish which covers the entire sign. The pressed wood fibre board is 3/16 inch in thickness. Steel drive posts are used for mounting the signs.

Carl W. Brown to Head Road Builders' Assn.

Carl W. Brown, Chief Engineer, Missouri State Highway Department, is the official nominee for President of the American Road Builders' Association for the coming year, to succeed Major Chris J. Sherlock. Mr. Brown was graduated from the University of Missouri in 1910, after which he became an engineer in the Maintenance Department of the C. B. & Q. railroad lines west. He had previously served as engineer on electric railroad construction and toll road construction. After several years of private work as an engineer and contractor, and as county engineer in 1918, he joined the staff of the State Highway Department as office engineer, then became chief clerk, engineer of surveys and plans, and assistant chief engineer before attaining the position of chief engineer. Mr. Brown is a past president of the Missouri Highway Engineers' Association and the Mississippi Valley Association of State Highway Departments. He is also on the Executive Committee of the American Association of State Highway Officials and a member of the Missouri State Council of Defense.

Nominations for presidents of A.R.B.A. Divisions, all of which are tantamount to election, include: James J. Skelly, President, Associated Pennsylvania Constructors, Media, Pa., Highway Contractors' Division; R. B. Traver, County Superintendent of Highways, Onondaga County, Syracuse, N.Y., County Highway Officials' Division; and Raleigh W. Gamble, Superintendent of Street Construction and Repairs, Milwaukee, Wis., Municipal Division.

Renominated as Association Vice Presidents are: Paul B. Reinhold, President, Atlas Equipment Corp., Pittsburgh; Charles W. Smith, President,

Smith Engineering & Construction Co., Pensacola, Fla.; Lion Gardiner, Vice President, Jaeger Machine Co., Columbus, Ohio, and Robert A. Allen, State Highway Engineer, Carson City, Nev. H. C. Whitehurst, District of Columbia Director of Highways, Washington, was renamed Treasurer.

Directors named for the term ending in 1946 are R. H. Baldock, State Highway Engineer, Salem, Ore.; Robert B. Brooks, Consulting Engineer, St. Louis, Mo.; J. F. Cast, Manufacturers' Sales Manager, Firestone Tire & Rubber Co., Akron, Ohio; Paul L. Griffith, Vice President, Koppers Co., Pittsburgh; W. R. Macatee, Managing Director, The Asphalt Institute, New York City; A. E. O'Brien, Secretary, Associated Pennsylvania Constructors, Harrisburg, Pa., and Nello L. Teer, contractor, Durham, N.C.

Remember the Salvation Army in your Christmas giving. That is an army which fights on every front, in war and in peace, armed only with kindness and mercy. They need your help.

KEEP 'EM POURING

Use **SOLVAY CALCIUM CHLORIDE**

IN THIS WINTER'S CONCRETE!

Get Extra Safety, Extra Speed, Extra Quality

War-time winter concreting operations call for speed—but not at the sacrifice of quality or safety! To obtain extra speed . . . and at the same time, added protection, added safety and added quality, use Solvay Calcium Chloride.

Saves on finishing, forms, protection costs and labor. Does not change normal chemical action of portland cements!

SOLVAY SALES CORPORATION
40 Rector Street
New York, N. Y.

use **SOLVAY**
CALCIUM CHLORIDE
with all
PORTLAND CEMENTS



FREE WAR POSTERS

Since the present series of war poster illustrations started to appear in Wickwire Spencer advertising, requests for them have been pouring in from every part of the country. Because of this wide-spread enthusiasm, the popular poster shown above has now been reprinted with the title which won first prize in a 4-state con-

test among war-workers. It symbolizes to workmen America's war-production spirit.

The painting is by the famous artist, Boris Artzybasheff, whose illustrations appear in Life Magazine, and on Time Magazine covers. The posters are of a convenient size; will fit wherever there is a 30-inch space.



Another Achievement for

WICKWIRE ROPE!

First manufacturer in all New England to be awarded the Maritime M and Victory Fleet Flag for outstanding production accomplishments.

MAIL THIS COUPON

Wickwire Spencer Steel Company,
500 Fifth Avenue, New York, N. Y.

Send free posters, "I Pull with Uncle Sam!"

Name

Company

Address



Photo by Public Roads Administration, F. W. A.

A PRA contractor using a heavy-duty grader on a section of the Alcan Highway.

Alcan Road Opened; Now It Can Be Told

Following the formal opening of the Alcan Highway, Commissioner Thomas H. MacDonald, Public Roads Administration, has released detailed information regarding the work accomplished. Over 6,000 civilian workers were moved into Canada and Alaska by plane, truck, boat and railroad to join with the U. S. Army engineers in cutting this road through with unparalleled speed. A total of 52 Canadian and American contractors with their equipment have worked on the road since March 6, 1942. A force of 500 engineers and engineering aides made the surveys and supervised the contractors' work.

In order to speed work, management contracts were negotiated with C. F. Lytle Co. and Green Construction Co., of Sioux City, Iowa, organized as a single firm; Dowell Construction Co., Seattle, Washington; R. Melville Smith Co., Toronto, Canada; and Okes Construction Co., St. Paul, Minn. These project-manager contractors recruited 47 construction contractors who, immediately following the approval of the individual contracts by the PRA, began to move men and materials to the job. E. W. Elliott of Seattle, Wash., had the contract for moving all of the equipment and the erection of shops, warehouses and other buildings. A large amount of CCC equipment was moved in to supplement that owned by the contractors. Among the major items were 300 tractors with scrapers, bulldozers or trail-builders, 1,000 trucks, 125 air compressors with drills, 55 power shovels, 200 electric-light plants, 65 portable repair shops, mixers, rollers, pumps and trailers.

Approach to the job was by three main routes: 1. by rail via Edmonton, Canada, to Dawson Creek, the beginning of the project; 2. from Seattle via the inland water route to Skagway, thence

by narrow-gage railroad to Whitehorse and to the job; and 3. from Seattle by inland water route and across the Gulf of Alaska to Valdez and thence by highway to the job. For water transportation the PRA obtained the use of five steam-

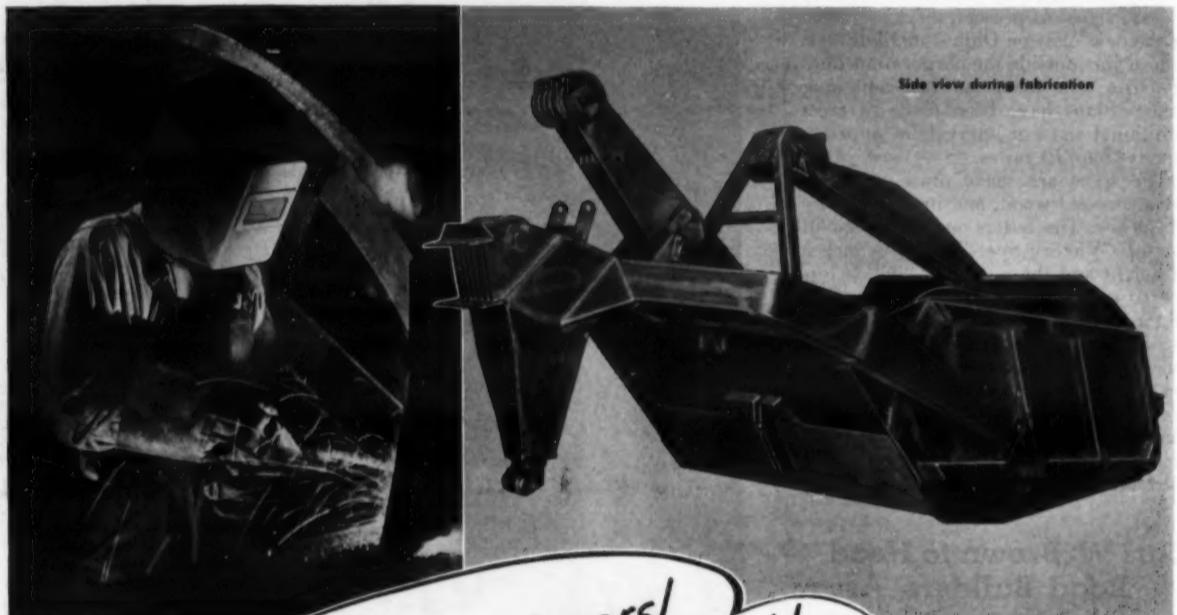
ships, one motor ship, five yachts, fourteen barges and ten tugs. About 1,200 men were flown to the northern end of the project to establish living quarters, shops, warehouses and other essentials for operation. Workers are housed in buildings from over forty CCC camps that had been dismantled, transported to the job and reassembled.

American and Canadian contractors have brought to completion the grading and surfacing of 102 miles of permanent road built to modern high standards. Seventy-seven miles of this work is on the south end of the project where it was not necessary to build a pioneer road. Army and contractors' forces have operated jointly to produce a satisfactory Army road for use this winter. In this pooled operation, forces of the contractors graded and surfaced many miles of the road. On hundreds of additional miles they have followed behind Army engineer forces, widening the road and doing additional grading and surfacing. These operations cover a total of 1,184 miles of the 1,600-mile route.

Traffic Drop Less With End of Summer

The continuous fall in the volume of traffic during 1942 on rural highways in the gasoline-rationed area ended abruptly in September, with traffic 43 per cent less than in 1941. This 43 per cent decline in September followed a 49 per cent drop in August, compared with 1941, and on the same basis with decreases of 41 per cent in July, and 39 in June. Decrease in traffic in the unrationed area in September was 21 per cent. The continuous downward trend that began in February, 1942, in the unrationed area, reached a maximum reduction of 27 per cent in August.

Further evidence of travel decline is given by gasoline tax collections. Collections in 32 states in September, representing fuel consumption mainly in August, totaled \$48,410,000, or 26 per cent less than a year earlier. In 9 rationed and 23 unrationed states, collections were down 35 and 20 per cent respectively.



Side view during fabrication

*My hat's off to Heil engineers!
Their all-welded Hi-Speed Scoop gets rid
of dead weight and moves twice as fast—
with longer service life and less
service trouble*



THE STRONGEST
GEARED
POWER
FOR ITS
WEIGHT
IN THE
WORLD

COMPACT—POWERFUL—SAFE
"For use where power is not practical or available"
Manufactured in 2, 5 and 15-Ton Sizes.
For capacity comparison, $\frac{1}{2}$ " cable used:
2-Ton "Lightweight" 75 ft.
5-Ton "General Utility" 250 ft.
15-Ton Triple-Geared "Special" 1300 ft.
Patent instant gear change and positive
internal brake that never fails, and will
lock load. Price, f.o.b.
Seattle
Gear Ratios Weight
2-Ton 4, & 22 to 1 60 lb. \$ 50
5-Ton 4, & 24 to 1 110 lb. \$ 75
15-Ton 4, 19 & 109 to 1 680 lb. \$250

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2724 6th Ave., Seattle, WASH.
Warehouse stocks for dealers' Supply: Seattle—
Chicago—Brooklyn—Houston. Complete Liter-
ature and List of Dealers in Principal U. S.
Cities and Foreign Countries Gladly Mailed.



"The fast performance of this Hi-Speed Scoop is something you can't argue with. Mister, it's there! When you can handle twice as much dirt in the same number of hours with a unit of the same size (compared with unit drawn by crawler tractor), you've really got something."

"But how does she stand up? Sure, you've got to know that. And it's right there that modern welding seems to work miracles, when the engineers know their stuff. Take a section almost anywhere — and you find increased strength in the Heil Hi-Speed Cable Scoop, compared with the old-style

heavyweights... And when you do have to take care of the wear-and-tear that's part of heavy construction work, there's no sitting around waiting for steel castings, because Heil design uses fabricated parts in place of steel castings. You weld 'em, then and there — and go back to work."

* * *

It was natural that Heil — a plate shop for years and a pioneer in welding — should go all the way in applying all-welded construction to dirt-moving machinery. This achievement was recognized by one of the highest awards in Lincoln Electric's national contest on welding applications going to a Heil engineer. You win too, with Heil Hi-Speed Cable Scoops — win greater profits with less trouble, and a reputation for fast, dependable performance. Select this all-welded equipment whenever available.



Box section design assures maximum strength with minimum weight. Due to this design, section can readily be increased or decreased in relation to the stress carried at that point.

HEIL ANSWERS
UNCLE SAM'S CALL
... and helps the
Arsenal of Democracy
Supply materials for
Victory!

THE HEIL CO.
GENERAL OFFICES: MILWAUKEE, WISCONSIN

Keswick Concrete Speeded to Place

Atkinson Kier Co. Has a Flexible Concreting Set-Up To Permit Handling Large And Small Pours Easily

By HENRY W. YOUNG

(Photo on page 56)

THE Atkinson Kier Co., contractor for Keswick Dam in California, struck hard and fast at this project, in what might be termed a campaign of offense. With 500 calendar days from official notice to completion of the contract, the company had a large crew of men on the job even before the receipt of the official notice, and achieved the first objective which was to complete concrete placing to flood-limit height east of the fish-trap section before high water.

An accelerated construction program, necessitated by the need of power for war production in this area, has been made possible by a contract extension, under which Atkinson Kier, which originally held a contract for the first stage of Keswick Dam, will continue construction of the dam to its ultimate height of about 138 feet. This contract extension makes it possible to build the second stage of the dam in about the same time as the remainder of the first stage.

Keswick Dam is part of the Bureau of Reclamation's Central Valley Project in California, and is being built 9 miles downstream from Shasta Dam, to provide a reservoir with a total capacity of 25,000 acre-feet, of which the top 10,000 acre-feet is for after-bay regulation at the Shasta power plant and the balance is dead storage. It will also provide fish-trapping facilities for the Sacramento River salmon-rehabilitation program and, last but not least, generate an additional 75,000 kilowatts of electrical energy.

The dam will be approximately 138 feet high from lowest rock and 1,027 feet long at the crest. It will have five sections, which include east and west abutments, spillway, fish trap, and power house. The major quantities involved are:

Excavation, common, exclusive of railroad	110,000 cu. yds.
Excavation, rock, exclusive of railroad	286,000 cu. yds.
Excavation, common, by-pass and right abutment above railroad	286,000 cu. yds.
Excavation, rock, by-pass and right abutment above railroad	165,000 cu. yds.
Excavation, highway, 1-1/3 miles to site	40,000 cu. yds.
Concrete, first phase	94,000 cu. yds.
Concrete for whole structure	175,000 cu. yds.

The original contract of the Atkinson Kier Co. covered the construction of the base of the dam and the excavation for a railroad by-pass 1,500 feet long, the Bureau of Reclamation furnishing the materials for the dam, and was awarded on a bid of \$2,736,628, the lowest of three submitted. The contract extension covering construction of the second stage of the dam added \$1,492,946 to the contract value.

In order to avoid an expensive railroad relocation, the dam is being built in two stages. Although traffic on the old Southern Pacific line through the canyon has now been routed over the

relocation to the east, it was necessary to keep the line open as far as Shasta Dam for the delivery of heavy machinery and equipment. The by-pass permits this to be done without interfering with the construction of the first stage of the dam.

Excavation

Caterpillars and Carryalls were used for excavating the overburden. Coming to rock, this was drilled with 10-foot holes on 7-foot centers each way. Some of the holes were sprung and some not, depending on conditions. Each was loaded with about 8 pounds of Hercules 40 per cent dynamite, using Atlas caps. Approximately 18 cubic yards of rock was loosened per hole, on the average. This rock was loaded by shovels to dump trucks.

The stationary compressor units, aggregating 2,650 cfm, serve the whole location by means of 6-inch pipe lines, with the exception of the mixing plant which is reached by a 4-inch line. One 6-inch line is carried across the river and branched, one branch leading to the



A Bucyrus-Erie 43-B 1 1/4-yard shovel loading to a dump truck near the right abutment area on the Atkinson Kier contract at Keswick Dam.

drill sharpening shop and the other extending parallel to the excavation. Four-inch pipes were used for drilling connections. A pressure of 105 pounds per square inch is maintained in the system.

It was found more economical to install a small cooling tower adjacent to the compressor plant than to pump from the river, a considerable distance below.

(Concluded on page 46)



LeTourneau Equipment Helps Make Alcan Highway Fast Construction Triumph

BOTH ENDS TO MIDDLE—Here U. S. Engineers, using LeTourneau Model LP Carryalls (15 heaped yards) with "Caterpillar" tractors, move dirt from cuts at each end of the haul to a fill in the middle, thus eliminate two turns each round trip and increase both number of loads and hourly yardage. Usually, as in this spot, working both ways gives you the advantage of downhill loading, too.

Hundreds of LeTourneau units helped the U.S. Engineers and private contractors push the Alcan Highway, through ice, snow, mud, muskeg and thick forests, to completion in less than one year. LeTourneau equipment, we believe, was chosen for many of the toughest jobs because:

1. Tractors equipped with LeTourneau Power Control Units are never tied down to one piece of equipment. They operate any LeTourneau rig—Dozer, Carryall Scraper, Rooter, Crane or Tournatrailer. Changes from one rig to another are easily and quickly made.
2. LeTourneau Power Control Units give you sure-acting, trigger-quick operation regardless of weather temperatures. With LeTourneau cable control, there's no oil to thicken in subzero weather or to thin in broiling heat.
3. Reserve strength—the result of stout-welded construction and oversize parts, such as axles and bearings—enables LeTourneau equipment to handle big yardages under punishing conditions. When repairs do become necessary, they often can be made in the field with a portable welding outfit. Many parts are interchangeable, thus requiring smaller parts stocks.

Pictures here show a few ways in which LeTourneau units speeded Alcan highway construction. What they did there, they can do on your tough jobs. Ask your LeTourneau "Caterpillar" dealer for details.



CRANE HANDYMAN—(Above) LeTourneau Crane makes it easy for resourceful Army engineers to bridge icy stream with timber cut on the spot. LeTourneau Cranes go anywhere a tractor can travel, are easily maneuvered, simple to operate.

FAST TRAVEL BETWEEN JOBS—(Below) Truck-hauling speeds (up to 14.3 m.p.h.) and extra-large-diameter tires enable Tournapulls to negotiate soft spots with ease or to travel on concrete. This one is speeding from a completed assignment to another job on the Alaskan Highway under its own power—no hauling equipment tied up moving it.



LE TOURNEAU

Manufacturers of DOZERS, CARRYALL* SCRAPERS, POWER CONTROL UNITS, ROOTERS*, SHEEP'S FOOT ROLLERS, TOURNAPULLS*, TOURNAROPE*, TOURNATRAILERS*, TOURNAWELD*, TRACTOR CRANES.

*Name Reg. U. S. Pat. Off.

Carey Elastite
EXPANSION JOINT

Standard in Concrete Construction for 26 Years
ECONOMICAL and EFFICIENT
Asphalt Joint • Rubber Joint
Non-Extruding Expansion Joint
Plate-Dowel Expansion Joint
Sub-grade Felt

THE PHILIP CAREY MFG. CO.
Dependable Products Since 1873
LOCKLAND, CINCINNATI, OHIO

Wyoming SN Highway Gets Oil-Mat Surface

(Continued from page 6)

the roadway in both directions and rolled to compaction by pneumatic rollers. Because the work was done late in the season and it was impossible for the chip seal to be applied before possible snowfall, a prime of 0.12 gallon per square yard of RC-2 was given the surface and the job left for the winter. The compacted oil mat with the aggregate used gave a weight of 139.5 pounds per cubic foot.

The chip seal was applied in the spring of 1942. A tack coat of 0.33 gallon of RC-4 per square yard was applied and then immediately covered with 20 pounds of chips per square yard. The chips are a maximum $\frac{1}{2}$ -inch screen size with 0.5 per cent passing a No. 10 sieve. This required about 141 tons of the chips per mile of road. After the RC-4 tack coat and the seal had been completed, the contractor was required to go back and with a narrow spray bar apply RC-4 at the same rate for the full width of the mat outside the chip seal and also for 3 feet on the gravel shoulder. This requirement is of great value in protecting the entire road structure as it waterproofs the edge of the road twice, once with the prime and once with the RC-4, so that water does not have a chance to get in under the edge of the mat and destroy it. This is of particular importance where piles of snow along the edges of the road as late as June constantly melt and let moisture run along the edge of the mat.

Curb and Spillways

An oil-mat curb was used along the edges of all fills where there was danger of the accumulated water eroding the fill. The curb materials were mixed off the roadway in the same proportions as the oil-mat for the road. The curb is pyramidal in shape with a 4-inch top, a 12-inch sloping face toward the roadway and an 18-inch sloping face toward the shoulder. The total width of the curb is 3 feet and its height measured from the edge of the oil mat on the road is 3 inches although since it was placed at the edge of the sloping gravel base it actually is higher than the dimensions would indicate. The contractor had the curb shaped roughly by the men placing it and then it was rolled by a "spool" roller that gave it the required uniform shape.

The spillways were built 4 inches deep with a 12-inch flat bottom and 8-inch sloping sides. The top at the curb was warped into the curb in a workman-like-manner and the bottom flared to spread the flow of water in the ditch. The spillway was built of the same material as the road surface and was given a seal coat to protect against erosion.

Personnel

This project was built for the Wyoming State Highway Department, Frank Kelso, Superintendent, with Fred Seward, Resident Engineer for this contract. Kenneth Mann was Superintendent for the paving contractor.

Belt 1100 Feet Long Lifts Ore 240 Feet

A new type of belt which has tremendous possibilities in the construction field for the handling of heavy aggregates over long distances and with unusual lifts has recently been manufactured by Goodyear Tire & Rubber Co., Akron, Ohio, for the use of a mining company in Minnesota. By means of a newly developed carcass of steel cables the belt completes the lifting task in one continuous operation, doing away with the

one, two or three transfers from individual belts which would have been necessary with the old types of conventional cotton-fabric or cotton-cord construction.

Although no thicker than a conveyor belt with, for example, six plies of fabric, the strength of the new belt is actually the equivalent of fourteen such plies. The carcass of each steel belt cable consists of parallel steel cables, each one containing a multiplicity of closely laid thin strands. In this ore belt there

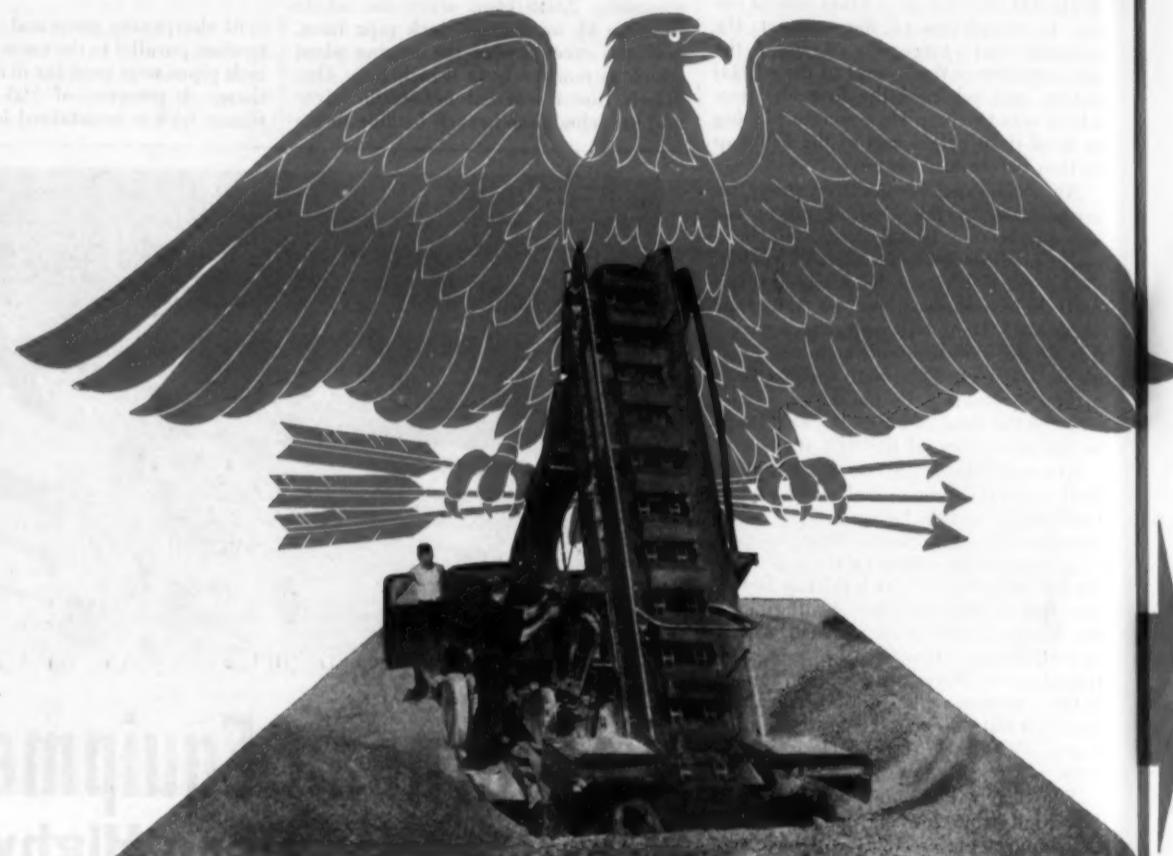
are 1,341,000 feet of cables, or, in terms of miles, more than 253 miles of cables. This type of cable permits a maximum of troughing without injury to the belt itself so that heavier loads can be carried on the belt without spilling over the sides.

An A-C Shop Welder

An alternating-current shop welder made by the Welding Apparatus Co., 2750 W. Van Buren St., Chicago, Ill.,

and available in three sizes, 60, 155, and 255-ampere, for 220 and 440-volt power supply is described in detail with a table of all electrical characteristics and dimensions in a new bulletin "Weld It". Seventeen features of claimed superiority of the Positive Arc welder are listed in the bulletin for checking with your present equipment.

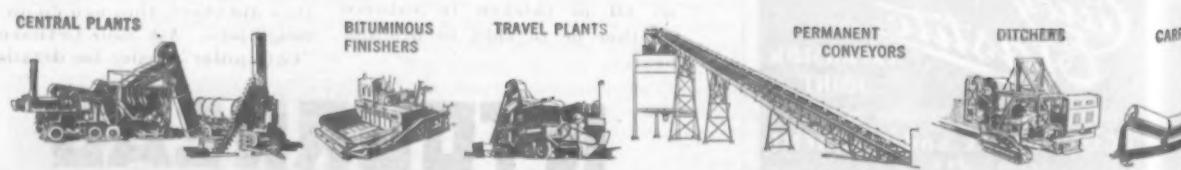
Copies of this bulletin will be furnished free on request to those mentioning CONTRACTORS AND ENGINEERS MONTHLY.



BARBER-GREENE OWNER

AND THE

WAR



Snow Removal Costs Increasing in Maine

The increasing cost of almost everything, due to the war, is expected to "up" the cost of snow removal and sanding on Maine state highways this winter around \$100,000 over last year, according to Stillman E. Woodman, Chairman of the Maine State Highway Commission. The cost of plowing and sanding about 14,450 miles of highway in the winter of 1941-42 in Maine was

\$1,383,900, of which towns paid about \$538,700.

The situation in Maine is serious in that about sixty contractors feel that they cannot renew their plowing contracts with the towns without increased compensation. Further, Mr. Woodman states, the Highway Department may find it difficult to meet the increased cost of plowing and sanding as income from gas tax and license fees declines.

Buy U. S. War Bonds regularly.

Pavement Breakers And Clay Diggers

A very complete line of pavement-breaking and clay-digging tools which fit all standard compressed air hammers is listed in the latest illustrated literature of Vulcan Tool Mfg. Co., 35-43 Liberty St., Quincy, Mass. Vulcan tools include moil points, digging chisels, chisel bits, asphalt cutters, heavy and light clay spades, sheeting drivers, frost wedges, dirt tampers, flat picks, solid

drill steel and detachable bit rods.

Each of these tools is made with the proper steel for its particular type of work and then heat-treated and forged in accordance with the best present-day metallurgical knowledge, according to the manufacturer, which is backed with 51 years of tool-making experience.

A complete illustrated catalog of Vulcan tools with data on each tool will be sent promptly upon request by the manufacturer to those mentioning this review.

You Barber-Greene owners are fortunate in having machines which have proven their ability to last for years of service. During the present emergency, it is important that every precaution be taken to keep your Barber-Greene in good condition. The delivery of repair parts is becoming uncertain. Many broken parts are due to carelessness, or improper maintenance. It is impossible to outline here all of the points to be watched. Good, sound horse sense must be exercised.

THE IMPORTANCE OF LUBRICATION

★ Nothing can add to the life of the machine more than thorough lubrication of the moving parts, properly executed at the proper intervals with the correct lubricants. A breakdown resulting from improper lubrication is inexcusable. Correct and systematic lubrication can be maintained with little or no loss in operating time.

OPERATE WITHIN THE MACHINE'S CAPACITY

★ You will lay more road or handle more material in the long run by refraining from crowding your Barber-Greene. A good operator who has the "feel" of his machine can immediately sense an overload. There are times when momentary overloads cannot be avoided, but for the long steady pull, operate within the machine's normal capacity.

KEEP YOUR MACHINE IN PROPER ADJUSTMENT

★ Make regular checks of all of the adjustable points on your Barber-Greene. Particularly notice chain slack and bearings. A chain which becomes too loose can climb the sprocket and seriously damage the machinery.

WATCH SUCH VITAL POINTS AS THE AIR CLEANER

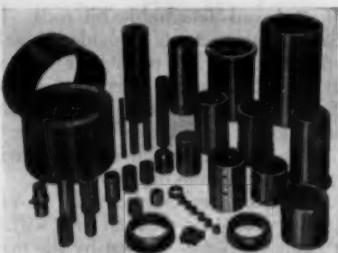
★ Your Barber-Greene is equipped with the air cleaner suitable for the type of work done by the machine. Many Barber-Greens operate in highly abrasive dust which can wreck an engine if it gets into the cylinders. Carefully follow the instructions on the air cleaner, oil filter, etc.

ALWAYS GUARD YOUR RUBBER BELT

★ Load the belt evenly. Have a hopper or some other arrangement for preventing large chunks from striking the belt at the loading end. Keep the belt properly aligned. Do not convey hot materials with your Barber-Greene Belt Conveyor unless it has a special "hot belt." (Even a special hot belt can be damaged from material above 300 degrees or by hot material which is discharged onto the belt conveyor when it is idle.)

BARBER-GREENE COMPANY, Aurora, Ill., U. S. A.





A group of new Lubritex bearings.

New Fabric Bearing To Replace Metals

The shortage of critical bearing metals has led to the development of a new oil-lubricated non-metallic moulded bearing known as the Lubritex bearing. Gatke Corp., 224 N. LaSalle St., Chicago, Ill., manufacturer of these bearings, reports that they are made of various material combinations developed especially to meet all kinds of service conditions using grease or oil lubrication. Gatke further states that they are replacing conventional bearings with satisfactory results, as they stand up under impact loads that are too great for metal bearings, have much greater wear life and lower friction. Lubrication is said to be much less critical and they do not score journals even if the lubrication fails for limited periods.

These new non-metallic bearings are engineered for the specific application and moulded to finish dimensions in all shapes and sizes for replacing metal bearings. Performance results on a wide range of service conditions are described in a catalog which will be furnished promptly by the manufacturer.

Reduce Scrap Piles And Save Manpower

A recent issue of *Metco News* contains an editorial "Salvage Before Scrap!" which we take pleasure in reprinting because it applies to the construction industry just as well as it applies to the machine tool field.

"There's little need to repeat here what we already know about the importance of scrap metal. Your existence and ours depends upon the ability of every one of us to keep steel mills and foundries fed with this precious junk. But you are defeating WPB's program and throttling your individual part in the war effort by junking parts that could be salvaged!

"Sounds like common sense, doesn't it? But the fact is that hundreds . . . yes, thousands . . . of tons of still valuable shafts, rolls, spindles, pistons, rods, and similar parts are being heedlessly thrown into the local junk heap because they are worn. This is not patriotism—and certainly it's no assurance of similar replacements when they are needed most. It's waste of vital man-hours and precious metal if the part can be built up into its original form again or remade into other useful products.

USE RIGHT BUCKET FOR THE JOB



Hayward makes all four—clamshell, dragline, electric motor, orange peel. A Hayward recommendation is unprejudiced.

THE HAYWARD CO., 32-36 Dey St., New York
Hayward Buckets

"Check your old equipment—with a sledgehammer in one hand, but with a metallizing gun in the other! Take those worn shafts that are still structurally sound and build them up on the spot! Do the same with those rods and spindles from discarded machinery, or machine them down for use elsewhere! With a thin coating of high-carbon steel they'll last longer than the originals.

"Let's get into the scrap with all we've got—but let's do it the way WPB wants it . . . with useless scrap!"

This same issue of *Metco News*, Volume 1, Number 12, contains an excellent article on reducing scrap piles and maintenance costs at the same time and is replete with illustrations showing the building up of pistons, crankshafts, crank pins, motor axles, pump shafts and other parts by building up worn surfaces with sprayed metal.

Copies of this issue of *Metco News* may be secured direct from Metallizing Engineering Co., Inc., 21-09 41st Avenue, Long Island City, N. Y., by mentioning this review.



Men take a keen delight in operating Sterling Wheelbarrows because of their well-balanced, able-to-take-it construction and easy wheeling qualities. Veterans of long years of service, Sterlings are invariably the preferred method of material transport—for both war-time and peace-time production.

STERLING WHEELBARROW CO., Milwaukee, Wis.

Look for this Mark of Sterling Quality

Sterling
WHEELBARROWS

"You Can Always Keep Going With GOODALL"



JET HOSE
STEAM HOSE
BOOTS AND
CLOTHING

JET HOSE

If you're looking for dependable Jet Hose, try Goodall's "Duration" Style D-119. From the earliest jetting operations, Goodall Rubber Company has been foremost in developing good strong hose for this severe service. "Duration" Style D-119 is "softening up" the way for thousands of piles on military and essential industrial projects. The familiar "Allgood" white cover has been replaced with black. Sizes: 1½" to 4", inclusive; maximum lengths of 50 feet. For pressures up to 250 lbs.

STEAM HOSE

"Inferno" Steam Hose is still tops for high, hot pressures to 200 lbs. at 400° F. No lowering of quality on this "Standard of Quality" brand. For greatest safety under extreme conditions, constant flexing, etc., buy "Inferno." Sizes ½" to 2½", inclusive; 50' maximum lengths.

BOOTS and CLOTHING

Goodall's line of wet-weather clothing, rubber and oiled, and the unequalled quality of "Toe-Saver" and other footwear, are well known to contractors. Many items are no longer available and rubber footwear is being rationed, but Goodall is still supplying all essential war-work requirements.

GOODALL KNOWS SYNTHETICS

Ever since synthetic rubber was commercially introduced, GOODALL has been a foremost compounder of this man-made product. For a number of years, synthetic compounds have been used in making several items in the GOODALL line. Every day, at our factory, we are "batching" four of the basic synthetics for regular production runs. As your rubber replacements needs arise, it will be well to remember . . . "You can always keep going with Goodall."

Have you been getting our "Rubber Conservation" bulletins? Write our main office . . . it's not too late to receive the entire series.

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Factory—Trenton, N. J. Established 1870. 72 Years of "Know How," our most valuable commodity.

GOODALL RUBBER CO. OF TEXAS

GOODALL
RUBBER COMPANY INCORPORATED

Highway Maintenance In Rural Ohio County

Surface Treatment Program Started by Brown County County Fair Sheds Used For Equipment Storage

A VERY convenient arrangement exists in Brown County, Ohio, which permits the County Highway Department to use the various buildings on the County Fair Grounds for equipment storage for 51 weeks a year. For the remaining week, in October, the machines have been moved out, while cattle with their exhibitors and visitors took over for the week. John R. Kay, County Engineer, is greatly pleased with the economies which this offers, but waxes enthusiastic over his road-mix program which up to the "asphalt freeze" had surfaced 75 miles of the 250 miles of county road. The balance of the system has a crushed-stone surface.

Because of the essentially rural character of the county, with only two cities and both of those less than 1,500 population, and the very sparse traffic on county roads, it has been impossible to create any interest in taking more than a 40-foot right-of-way. The road surface varies from 12 feet to 18 feet maximum width, the latter being on the surface-treated roads. The slopes on fills are usually 1½ to 1 with some 2 to 1. The ditches vary widely and practically all backslopes are 1½ to 1.

Road-Mix Methods

The road-mix program, now suspended for the duration, was based on as economical methods as possible for a county of the rural character and financial status of Brown County. A road which was to be surface-treated with road-mix usually had a 6-inch surface of compacted crushed stone. This was bladed intermittently for about one month to get the proper smooth surface and then just before work was to be started on the surface treatment, all loose material was bladed onto the shoulders. A rotary broom was hired to clean the surface thoroughly of all loose fines.

On this clean surface, between 0.33 and 0.4 gallon per square yard of CT specification tar was applied and al-

lowed to dry completely. All traffic was kept off the road insofar as possible for two or more days. Then a flat windrow of crushed stone was spread 6 feet wide, consisting of 60 to 75 pounds per square yard for the 18-foot width. This windrow was shot with 0.1 gallon for each 10 pounds of aggregate per square yard in the surface treatment. Either RT-6 tar or MC-3 asphalt, or for fast work RC-3 asphalt, was used. The windrow was bladed back and forth by a power grader until completely mixed. If rain interrupted the mixing, the material was windrowed and then when the base had dried the windrow was cut open and allowed to dry before further mixing was done. The work was usually done in ¼-mile sections.

The thoroughly mixed windrow was

placed in the center of the road and then a power grader with the blade set straight across the road was run down the windrow to spread it about 1½ inch thick when loose. This left a miniature windrow at each end of the blade which was spread to the sides to take care of the edges of the roadway by pulling a Gledhill maintainer behind the grader. The long runners of this maintainer insure a smooth spread of the edge material

which is of great importance to the life of the road-mix surface.

After the material was spread, all traffic was kept off the road for a few hours to allow it to become tacky. The surface was then rolled by a 7-ton tandem roller starting at the edges and rolling straight back and forth, up and down the road. After a period of two or three days or even longer, if condi-

(Concluded on page 45)

DAVENPORT-FRINK SNO-PLOW USERS

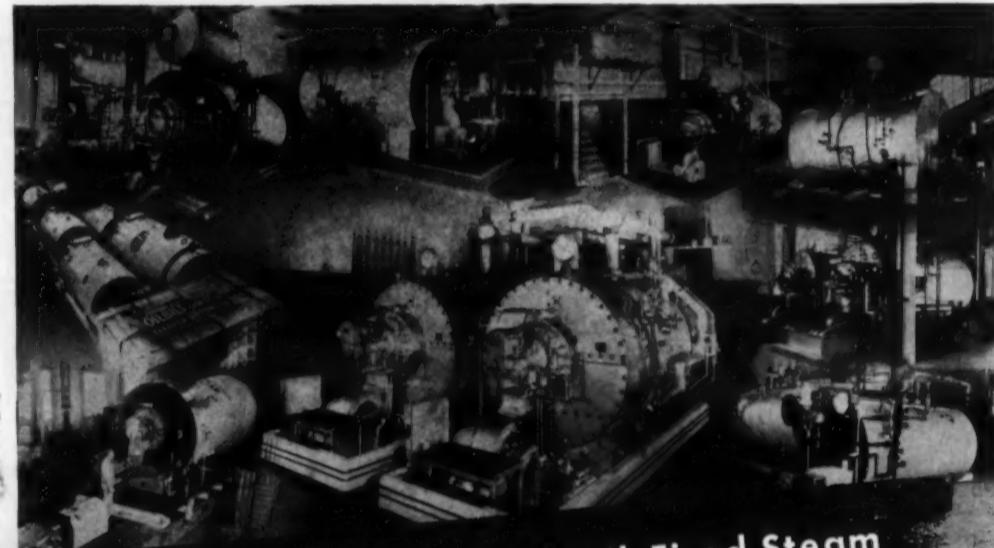
Order Repairs EARLY BUT, Do Not OVER-BUY



Some can obtain Sno-Ploows and repair parts. High priorities are required for new Davenport-Frink Sno-Ploows—thus eliminating all buyers except those engaged directly and importantly in the War Effort. Through arrangements with W.P.B. no high priorities are required for Sno-Plow repair parts. However, it is essential that orders be placed SOON—and we urge that you do not OVER-BUY.

DAVENPORT BESLER CORPORATION

Dept. A
Davenport Iowa
Made in Eastern U.S.A. by CARL H. FRINK, 1000 Islands, CLAYTON, NEW YORK



Reproduction of photo-mural, as shown in the Cleaver-Brooks offices, depicting representative Oil-burner steam plant installations.

The Cleaver-Brooks Principle of Oil-Fired Steam Generation . . . Finds a Vitally Important Application in Equipment for Our Fighting Forces



Reproduction of photo-mural which is a composite illustration of various types of Cleaver-Brooks equipment built for our armed forces.

DANDUX

Canvas Products

Built to exacting quality standards, of finer materials, Dandux Canvas Products have earned recognition and preference in the construction field during the past quarter century.

Their superior construction assures longer life, greater durability and service, yet they cost no more than the ordinary.

For your requirements of Tar-paulins, Covers, Bags; in fact, *anything* of canvas, consult our nearest office, and let us prove that the Dandux trade-mark assures you of greater value!

C. R. DANIELS, INC.

Manufacturers of Everything of Canvas

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C. & E. M. Photo
Part of the drill crew and the dynamite at the east heading of the Continental Divide Tunnel, S. S. Magoffin Co., Inc., contractor.

Work at East Portal Of New Water Tunnel

(Continued from page 2)

be out of the way and not interfere with the trains and with men moving about in the parts of the tunnel where they must walk is an important consideration in tunnel driving. This job is unusually clean, with the very minimum of materials of any kind along the sides of the tunnel and with each utility in its place and firmly fixed. The 2-foot gage track in the bottom of the tunnel is well ballasted and reasonably straight with few wobbles other than moving to one side at the sidings. At the right of the tunnel, as one enters to approach the heading, near the bottom is the 2-inch water line to supply water to the drills. This is not a high-pressure line as there are two booster pumps in the tunnel. Gravity flow is used for the first section of the pipe from the portal. Next above the water line is the 6-inch high-pressure air line for the drills. The size of the pipe makes it a continuous air receiver, but in addition there are three receivers and water traps in the first 30,000 feet of the line. The first of these is 7,500 feet from the portal, the next 12,000 feet and the third 26,000 feet. Only the first collects water and, for a very good reason, the tunnel near the portal is "air-conditioned". This may be explained by the fact that the rock near the portal has a permanent

temperature of 48 degrees F. while the rock increases in temperature up to the heading. At 30,000 feet from the portal the temperature of the rock is 74.1 degrees. Thus, while the air as delivered

to the line is somewhat warm in spite of intercoolers, the moisture is largely condensed out of the compressed air in passing through the cool zone within the tunnel.

Immediately above the air line is the 2,300-volt power line for the blowers and above this the 20-inch 14-gage steel air vent pipe with the lighting wires and 50-watt electric lights affixed to it at 60-foot intervals. The ventilation pipe is well out of the way of the heads of the men riding in the man-car or on locomotives, thus minimizing the possibility of accidents through careless men taking off their "hard hats" for a moment during a trip. On the left side of the tunnel is the telephone line up to the firing station but beyond that this side of tunnel is used for the wires from the shooting transformer.

The system of ventilation to provide quick return of the men to the heading after a shot was fully described in CONTRACTORS AND ENGINEERS MONTHLY, October, 1942, page 25. The Roots-Connersville blowers on the ventilation

system are now spaced slightly farther apart than normal working efficiency would dictate because more blowers cannot be purchased under the low preference rating of this job. The first blower

(Continued on next page)



Front End Shovels For Industrial Tractors

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Build Quicker
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Jumbo for Drilling On Magoffin Project

(Continued from preceding page)

is outside the portal, then the next is 12,000 feet inside and the remainder at 9,000-foot intervals. They heat up slightly under the present overload. In order to provide perfect safety and the maximum of movement in the tunnel on the single-track line, the entire length of the tunnel was equipped with a G-E electric-eye traffic-control system. This was described in full in CONTRACTORS AND ENGINEERS MONTHLY, June, 1942, page 46.

To permit the muck trains filled for the dump passing around empties or other service trains entering and proceeding toward the heading, the tunnel has sidings about 6,000 feet apart with a block light every 1,000 feet. Two California-type switches 200 feet long are used close to the heading so that they may be moved ahead speedily. These are a complete unit of switch, siding and passing track which have attachments on the bottom for rollers that fit the 2-foot gage track. Thus the entire siding may be rolled ahead over a section of track into a front-line position. These are used as sidings for the jumbo during firing, and for storage of extra mucking machines and empty muck cars.

Drainage of this section of tunnel is somewhat easier than at the west portal as the grade is toward the east portal. Advantage is taken of this by keeping the areas beside the track clear of rock and trash so that the water runs out largely by gravity to sumps provided where small sump pumps deliver it to a drainage ditch alongside the track. There are two small heading pumps at the face to remove water gathering from the operation of the drills and to keep the heading dry for the men, particularly after the heading has been wet down immediately after a shot.

The Bureau of Reclamation engineers have devised a novel and very effective method of carrying their line for the tunnel. Instead of the old slot in a shoe box for a back-sight, they use a series of flashlight bulbs operating off small transformers, painted red to distinguish them, and spaced about 500 feet apart. As the heading advances, the rear light is moved ahead so that a series of back-sights is always available and, by sighting on four bulbs, one is absolutely sure that the instrument is in line.

Jumbo Drilling

The jumbo for this small tunnel is no giant as far as size is concerned but is a demon for work and effectiveness. It is carried on two trucks running on the narrow-gage track and is built up on a 6-inch H-beam frame. The upper frame is entirely welded of 4-inch pipe which is used to carry the air and water forward to the drills, thus eliminating hose lines to the front of the jumbo in close quarters. Two wing platforms for the drillers fold down when the jumbo is being moved and the middle section of the jumbo is used for the storage of steel and wooden tamping rods. The jumbo

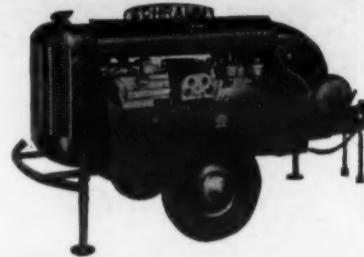
pulls a steel car with sections for each length of steel for the detachable bits. Behind that is the dynamite car.

The jumbo carries four Ingersoll-Rand DA-35 drifters which use I-R Jack-bits. There are two men on each drill, a driller and a helper, and two nippers for the four drills. Two spare drills are carried on the jumbo to minimize loss of time in case of trouble and two other spares are kept at the second siding. There is no spare for the jumbo so that any damage done to it is repaired while it is in action, using an acetylene welding outfit.

The drilling diagram presents a complicated maze of holes but that it is effective is shown by the fine progress made in the tunnel and the clean breaking of the rounds as fired. A round is composed of 34 holes, the 4 cut holes being drilled diagonally 9 feet deep and the 4 cut-hole relievers the same depth, with all others 7 feet straight using 3, 5 and 7-foot steel and the one set of 9-foot steel for the cut holes.

(Continued on page 50)

SPEED TO GET THINGS DONE

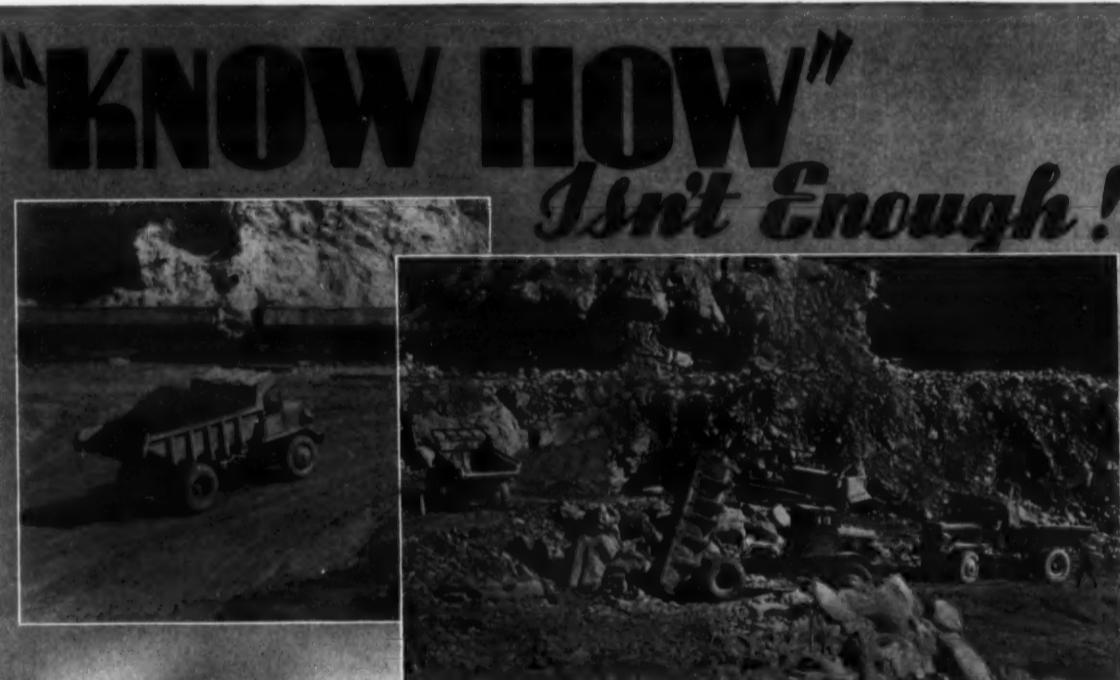


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• Simply knowing how to operate Rear-Dump or Bottom-Dump EUCLIDS doesn't mean that the full life and efficiency of the units will be obtained unless the "know how" is carefully utilized. For example, low gears should always be used in starting, but it is a rather common practice to start in one of the higher gears simply to save a little effort. Sure, Euclids will start in the higher gears, even with heavy loads, but this causes excessive wear on the transmission, clutch and other parts, resulting in higher maintenance costs and more time off the job.

Another place where "know how" must be applied is in the use of the instruments on the dash. Those instruments provide an "x-ray" of the engine at a glance — they indicate that it is operating properly or warn that it needs attention. Unless engine operation, fuel and air pressures, etc., are carefully checked every shift before the unit goes on the job, and frequently during operation, damage to parts, inefficient performance and costly delays may occur. By using "know how" to keep the Euclids you own or operate in good condition so that they can do the jobs that bring victory closer, you'll be helping to build a better America of tomorrow.

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The Blankner crack-sealing machine.

A Portable Machine To Fill Road Cracks

A crack filler that is a complete unit on two wheels and which can start out in the morning and fill cracks all day, with short stops for the addition of fresh lumps of bitumen to the 25-gallon kettle, is being marketed by Duggan's Inc., 206 Auditorium Bldg., Cleveland, Ohio. The 12-inch wheel chassis carries the 25-gallon flue-type kettle, a 5-gallon fuel and pressure tank, and a ring burner to heat the kettle, as well as torches for heating the discharge control valve, the ironing shoe and the pavement crack ahead of filling. The burners are individually controlled. The heated bitumen passes through a channel and the discharge is controlled by a needle valve 1 1/2 inches above the pavement surface. The ironing shoe is U-shaped and limits the spread of the crack filler to a narrow ribbon as well as ironing it to assure a positive seal.

The complete unit is pulled by hand and guided over the crack by the handle with the controls convenient to the operator. A more detailed description with complete instructions and priority requirements for ordering may be secured direct from Duggan's Inc. by referring to this descriptive text.

Tension Big Factor In Lives of Belts

The length of life of transmission belting and V-belts is greatly influenced by the tension factor. An increase in the tension over that recommended by the manufacturer for the operation of the belt will result in failure long before the belt should break down, according to data resulting from a series of tests conducted under the supervision of George H. Stewart, Belting Engineer of The B. F. Goodrich Co., Akron, Ohio.

Three grades of the present wartime construction of transmission belting were used in a series of tests which were run at 15 pounds per inch per ply, a 720-pound total for the tension, the recommended figure, and at 18 pounds per inch per ply, a total of 864 pounds tension, on 4-inch pulleys. The belts were all 6 inches wide, 30 feet in length, and spliced in 10-foot endless lengths. The tests were all highly accelerated. The conclusions reached are that an increase of 3 pounds per inch per ply over the



Complete line of gasoline, pneumatic and electric driven concrete vibrators and grinders. Write for information and prices.

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recommended tension results in the belt giving only approximately to one-third of its useful service life.

Similar conclusions were drawn from tests conducted on one style of V-belts used on a popular washer. The accelerated test consisted of a dead load suspension with the driver sheave 2 5/8-inch outside diameter x 1 1/2-inch top x 36 degrees and the driven sheave of 5 1/4-inch outside diameter x 1 1/2-inch top x 40 degrees. The first three belts, under tension of 125 pounds center to center, averaged 4 1/2 hours of life before failure. The second three, under 95-pound tension centers, averaged 27.4 hours, while the last three, under 80 pounds, averaged 86 hours.

In giving these test results, The B. F. Goodrich Co. points out that because of their short, highly accelerated nature, they are not an index to life in actual service, and were made only to get data on the ratio of tension to belt life. To have any direct evaluation to real service, tests should be made for much longer periods, the report states.

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All of our equipment is now lubricated by RING-FREE Oil and Grease. Thanks to RING-FREE.

Yours very truly,
Shaffer & Max
James J. Sanger
O. Casciotti

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“At 30° below, with other oils, had to tow the tractors to start the engines.”

THE EIGHT TRACTORS in the Shaffer & Max fleet must haul heavy textile machinery from Allentown, Pa., as far south as Florida and as far north as Quebec.

“On our trips to Canada,” writes O. Casciotti, service manager, “during the winter months at 30 degrees below zero, with other oils, we had to tow the tractors to start the engines, which cost us \$5.00 per tow each morning until we were asked to use RING-FREE.

“To our amazement we were able to start the engine after that with the starters. This immediate saving was the start of an economical operation which has netted us dividends ever since. All of our equipment is now lubricated by RING-FREE.”

What RING-FREE has done for others, it can do for you. Write us!

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Texas Nail Pickers Perform Dual Role

Trucks with Magnets Aid Tire Saving by Reducing Flats and Also Add to the Collection of Scrap Metal

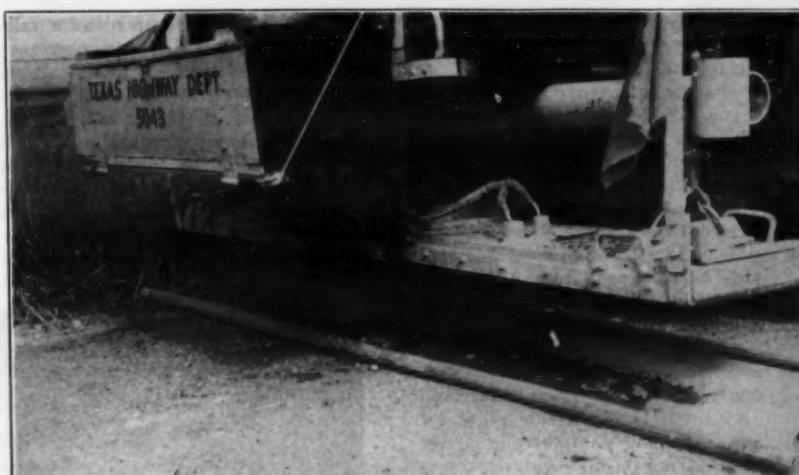
ORIGINATED several years ago to reduce the flats caused by nails and other bits of metal on gravel roads, the magnetic nail pickers of the Texas State Highway Department today assume much greater importance because of the rapidly diminishing supply of rubber tires for civilian use, and in gathering an unbelievably large poundage of small scrap iron which is now turned over to local salvage committees for war use.

This year they have also been operated on runways and aprons on military air fields and in Army camps scattered throughout the Lone Star State, saving tires on planes and mechanized military vehicles from punctures. Approximately 166,500 pounds of nails, nuts, bolts and other pieces of metal have been gathered from Texas highways during 1940 and 1941, and from roads, military reservations, air fields and essential war industry areas during the present year. This is equivalent to about 45,600,000 six-penny nails.

Operation

Two of the magnetic nail pickers travel over the state of Texas each year on regularly laid-out itineraries. Only one man is required to drive and operate each machine. It is mounted on a 1½-ton truck and can travel from 5 to 8 miles per hour when the magnet is working, and from 30 to 35 miles per hour when it is raised and the current off. The magnet has a surface area of 10 square feet and covers a sweep of 8 feet. It is suspended 4 inches from the ground when in operation. A rolled canvas carried in the truck is placed under the magnet when it has picked up a quantity of metal, the current is turned off, and the metal drops to the canvas. The metal is then placed in a storage box at the rear of the truck and at the end of the day, or of a run, it is deposited at some central highway section warehouse or location, and turned over to local salvage committees. The magnet can hold up about 200 pounds of metal on a smooth road or shoulder, before a "take" is removed.

The machines pick up everything from pins to pistols. A number of revolvers actually have been found on the



Nails and metal objects are dropped onto canvas when the current is cut off from the raised magnets of the Texas nail picker.

magnet. Much of the nails, staples and other pieces of metal are from old fences at places where highways have been widened and the dirt pulled in to make the

roadbed and shoulders. Much also is gathered along roads and highways in places where new buildings are erected, or other construction takes place. Nor-

mally the nail pickers work only the designated 26,000-mile Texas state highway system, but during the war emergency they have covered more than 25 Army camps, air fields, a Naval air base, airports, ordnance plants and other war-industry plant sites. They also have been used on roads and city streets after fires, tornadoes, or other disasters.

Last year the machines traveled approximately 28,000 miles throughout the state. They operated over approximately 12,000 miles with the magnets activated and gathered nails and metal pieces from more than 5,000 miles of Texas roads. To increase the efficiency of the magnet on earth roads and shoulders, a light blade is operated ahead of the nail picker to loosen embedded nails and metal scraps so the magnet can gather them.

Details of Construction

The power plant for this nail picker is a four-cylinder 11.3-hp engine with a Kurz & Root generator attached in.

(Concluded on page 44)

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Running a machine in need of repairs one day longer than you should may require 10 times as much critical material when you finally have it fixed—be many times as expensive. Protect your own interest... help the war effort — have your Allis-Chalmers dealer repair, replace, rebuild your outfit now.

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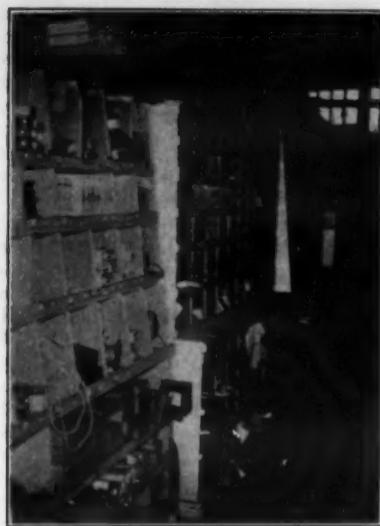
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ALLIS-CHALMERS
TRACTOR DIVISION - MILWAUKEE - U. S. A.



C. & E. M. Photo

The numbered bins in the stockroom at the Central Shops of the Arkansas State Highway Department in North Little Rock, Ark.

All Metal Salvaged; Worn Parts Rebuilt

(Continued from page 1)

cuttings, at the shops are now saved and sent to the NYA for salvage.

Saving and Rebuilding

Among the various salvage operations that are being carried on at the shops, those mentioned below are among the more interesting and effective. There are many others that are carried on economically and all might well be copied by other state and county highway departments.

The clutch faces of old Sixty tractors when worn are now built up even with the collar with welding rod and remachined to a micrometer finish for reuse in the heavy machines. Similarly axle and final drive shafts are being built up by electric welding, remachined and placed in service. Many of these operations are made possible because the Department has had a well-equipped machine shop for many years and is cashing in on this foresight now.

In spite of its large mileage of gravel roads which can be kept in condition for traffic only by grading with reasonable frequency, the stock of grader blades is very low. The last shipment received came to the State Shops in April, 1941. Old grader blades worn down unevenly in service are now being welded back to back with a butt weld, care being taken not to warp the pieces during the welding. It costs about \$3.00 for one complete weld that brings into being one usable blade that would cost about \$7.50 new. There have been very few breaks of these blades in service and those which have occurred have been in the northern part of the state where there is a great deal of heavy hard rock in the grades.

Detachable bits have always been reground several times for reuse and then tossed into a discard pile for sale as scrap. Now that pile is being gone over by one of the drill men to pick out any of the Timken bits that can take one

more grinding and give that much more service before being discarded.

Even the steel dump-truck bodies are salvaged at the same time that the parts of the engines are saved. The sheet steel in the dump bodies is now used for making rock chutes for use at the crushing plants. The state has five big rock crushing plants with capacities of 350 cubic yards or more in 8 hours, and eighteen smaller ones of 150 cubic yards in eight hours, as well as five portable crushers that run on the road to crush oversize material.

The old oversize pistons from engines are now being saved and ground down for smaller oversize as a necessary economy measure. The worn side plates of crushers are being continued in active service by laying in old spring leaves as fillers and welding in place. It works wonderfully. Every drive shaft, axle, spring, and every other part of an old truck is now saved and placed in new bins built in the yard at the Central Shops for possible use when other parts are not available. Only what cannot be

salvaged goes to the scrap pile for sale.

For some time it has been necessary for the state to make its own scalping screens for the crushing plants. Before war needs took all the flat rolled steel, the state purchased $\frac{3}{8}$ x 30 x 120-inch strip and cut 3-inch square openings in it for the scalping screens. Now the sheets cannot be purchased without a priority and A-10 is too low to get any service so that the last two screens that

called for help were built up on the worn sides with General Electric No. 25 general-purpose mild steel welding rod and have worked very well indeed.

A quick trip to the District 6 shop at the old state penitentiary showed an interesting repair job. A $\frac{3}{2}$ -yard shovel bucket used for rock work was badly in need of repair. The sides and the back of the bucket showed breaks and worn

(Continued on next page)



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For hard surfacing, resistance to wear, abrasion, and impact, P&H Alloy Electrodes may be obtained without priority. The only restriction is that the electrodes be used for maintenance and repair work.

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4-6% chrome steels, etc. Second, by answering your specific questions as to the proper choice and applications of electrodes to solve your maintenance and repair problems.

See your nearest P&H welding representative or write us for the list of P&H Alloy Electrodes along with recommended modern welding procedures.

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Canadian Distribution: The Canadian Fairbanks-Morse Co., Ltd.



Arkansas Conserves Rubber and Asphalt

(Continued from preceding page)

spots. It was completely rehabilitated with plates welded at the critical points and four new teeth made from old grader blades that could not be used further on the road.

The Rubber Problem

The "Rubber Drive" was a feature of late June, 1942, in every part of the country. The Arkansas State Highway Department went into the drive with zest and came out with colors flying. Every piece of hauling equipment in the Department carried a poster, 15 x 20 inches in size, bearing the words:

YOUR HELP NEEDED
Salvage Scrap Rubber
This Truck Will Haul It For You

Tons of rubber were picked up from farmers, urban and suburban dwellings, in fact anywhere that rubber might be found, and hauled gratis to service stations during the entire period of the collection drive. In addition, the Highway Department turned in 31½ tons of old rubber in the form of worn-out tires, old conveyor belt, suction hose and the like. The stock of discarded tires was very large, as all tires had been purchased at government prices and used until they were worn down to the carcass. Today, the Department must account for 8,795 tires of all sizes and makes. Tires are purchased on R-19 orders, with emergency certificates and proof of the sale of the old tire which the new one is to replace.

After taking thirty cars out of service to conserve the rapidly dwindling stock of passenger-car tires, the remaining six were pooled under the direction of the Assistant Highway Director as Travel Coordinator. In this manner several highway officials or engineers travel by one car or if the trips can be made more economically by bus or train, the cars are left in the garage and the individual travels by other means.

The new tire storage at the Central Shops is equipped with Red Comet automatic chemical fire extinguishers which are hung with the fusible tip downward singly or in groups in metal brackets. If the temperature rises above a certain limit, the fuse melts and the liquid forms a dense gas which smothers the fire.

All portable air compressors are being converted from pneumatic tires to steel wheels by using the small wheels from the old pull-type maintenance graders.

The Asphalt Pool

All of the asphalt equipment is being pooled as a result of the second asphalt freezing order which affected the southwest. There is a refinery at El Dorado in the southern part of the state, and instead of tying up a tank car for a 10,000-gallon shipment, which is the average job in the state, the asphalt-tank truck equipment is now pooled so that five of the 2,000-gallon trailer tanks can be available to haul to the job. Each of these tank trailers has a heating coil and each distributor has its heating equipment and pump. If a distributor hauls a

tank trailer, it carries its load and recirculates the two to maintain the temperature. Further, each District in the state has its own William Bros tank-car heater which is used to boost the temperature of the trailer tanks before the material is transferred to the distributor being used at the job.

New Paint and Paint Jobs

The standard paint of the Highway Department for all equipment was aluminum. With that out of consideration, it was felt that it would be better to use a paint that approximated aluminum in color rather than to make a complete change. Several paint companies were furnished samples of the aluminum paint used and asked to produce a "Highway Department Gray" that had the same characteristics as the aluminum paint. It was found that the new color came between other shades produced as standard so the new color came into being as HD Gray.

The paint shop has been busy applying the new paint with the spray equip-



C. & E. M. Photo
The end of a line of pick-up trucks laid up for the duration in District 6, Arkansas State Highway Department. The tires are under guard.

ment and has done a creditable job with the enamel-like gray. This shop is responsible for the painting of the warning blocks used when the highway striping machine is painting the center stripe on

the highways. The blocks used are made of a 4-inch square of hard wood with an old piece of conveyor belt bolted to it to form a loop so that it is easily picked up

(Concluded on page 47)



POZZOLITH (CEMENT DISPERSION) HELPED THIS PLANT DELIVER PLANES QUICKER...

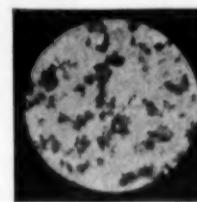
POZZOLITH (Cement Dispersion) — important technological development — is helping deliver war materials sooner... saving millions of ton-miles of vital transportation space... reducing cost of construction... producing concrete of unusual strength and durability.

Modern developments in synthetic rubber, plastics, steel, ceramics and many other basic materials have resulted from specialized applications of the dispersion principle. The specific dispersing agent for cement (lignin derivative, marketed as Pozzolith), now greatly increases the efficiency of all concrete.

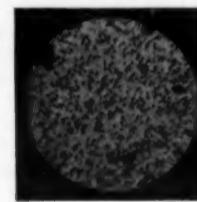
Used in millions of yards of concrete since 1932, Cement Dispersion has demonstrated its ability to meet today's construction demands — speed, economy, durability.

Technical papers — "Economics of Cement Dispersion" (for mass concrete) and "Cement Dispersion and Air Entrainment" (for runways and pavement), sent upon request.

HOW CEMENT DISPERSION WORKS



Cement suspended in water
UNDISPERSED



Cement suspended in water
DISPERSED

WITHOUT POZZOLITH
In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the clumps. (See photomicrograph above.)

WITH POZZOLITH
Cement Dispersion drives these particles apart and (1) exposes their entire surface area to hydration, at the same time (2) making the water entrapped in the clumps available for lubrication of the mix. (See photomicrograph above.)

Pozzolith (Cement Dispersion) produces the following results in concrete: greater strength, workability, placeability, water-tightness, durability and lower costs.

THE MASTER BUILDERS COMPANY
CLEVELAND, OHIO
TORONTO, ONTARIO



MASTER BUILDERS



First Soil-Cement Highway in Indiana

A 9.093-Mile Experimental Section Laid With Gravel From Old Road; 0.4 Mile with Clay on New Location

(Photos on page 4)

THE state highway from Brownsburg, Indiana, north to U. S. 52 just southeast of Lebanon was the scene of Indiana's first venture into soil-cement stabilization. The general contract for grading, structures and a 20-foot cement-stabilized surface on 9.093 miles of Indiana Highway 267 was awarded to A. M. Skinner Co. of Morocco, Ind., for \$159,308.17. The entire soil-cement processing operation was subbed to Ohio Engineering Co. of Lorain, Ohio, which had had previous experience in this type of work at the Fort Wayne, Indiana, airport.

All except 2,000 feet of the project followed the line of the old road from which the 18-foot gravel surface was salvaged for the new cement-stabilized surface, on which 8.8 per cent of cement was used for the major portion and 9.2 per cent for 2 miles. Of the 2,000 feet of new location, the northern 1,000 feet received the same treatment as the remainder of the project and on the southern 1,000 feet of the relocation, the raw variable silty-clay soil was stabilized with 13.2 per cent of cement by volume.

Salvage and New Grade

The old gravel road had an 18-foot surface of compacted gravel about 8 inches deep. Skinner scarified and removed this 8 inches of material for the entire length of the old highway and stockpiled it at various locations to minimize haul. Then he built the new grade with a 42-foot top, allowing two 11-foot shoulders on either side of the new 20-foot soil-cement surface. In fill sections a 4 to 1 slope was used for fills up to 5 feet high and over 5 feet the slope was 2 to 1. In cut sections the backslope was 4 to 1 up to 2 feet of cut, and over 2 feet and up to 6 feet the backslope is variable, meeting ground surface within 3 feet of the right-of-way line. Where the cut was greater than 6 feet, the backslope is uniformly 2 to 1.

The grading contractor, upon completion of the grade, set 4-inch steel forms raised 2 inches from the sub-grade and backfilled with the stockpiled salvaged material to the 6-inch depth. This material was compacted only by the equipment and traffic. As soon as it had reached a reasonable degree of compaction, the forms were removed and the shoulder dirt pushed up against the salvaged backfill.

Placing and Mixing Cement

Because the salvaged backfill was so well graded, as shown by the table under "Technical Data", it compacted to a remarkable degree under traffic. This made it necessary for the processing contractor, Ohio Engineering Co., to run his power grader with a scarifier

attachment over the material, scarifying it to a depth of 6 inches and then shaping it to a crown of 2 inches preparatory for mixing the cement with the aggregate.

Using a chain with bits of red bunting tied to it at 54½-inch intervals, four men spotted and emptied two parallel lines of cement bags 30 inches apart and spaced 54½ inches along the road. The cement was luted to spread it evenly for a width of 10 feet and then a Flynn Road Builder was run over the 10-foot lane, moving at the rate of 7 feet per minute on crawlers driven by a Wisconsin motor. The Road Builder was supplied with water by one large truck having two 1,000-gallon tanks and two trucks each with a 1,500-gallon tank. It was aimed to mix the aggregate and

cement with about 11 per cent moisture which was slightly more than the optimum moisture but allowed for some evaporation.

Immediately behind the preliminary mixing with the Flynn Road Builder, a 5-foot power-take-off-driven Pulvi-Mixer was pulled over the section, making three trips over one 10-foot lane to complete the thorough mixing of the aggregate, cement and water.

The method of operation had considerable to do with the speed with which the material could be mixed. The contractor elected to mix a 10-foot strip 400 feet long up one side at the start of a day's operations, and then to run 800 feet, 10 feet wide, on the other side and continue with alternate 800-foot strips. In this way 400-foot strips were available for rolling for the full 20-foot width of the roadway. It is interesting to note that on the first day when the outfit was green, only 240 feet of 20-foot roadway was processed while on the second day this had been stepped up to 880 feet, on the third to 1,200 feet, and finally to



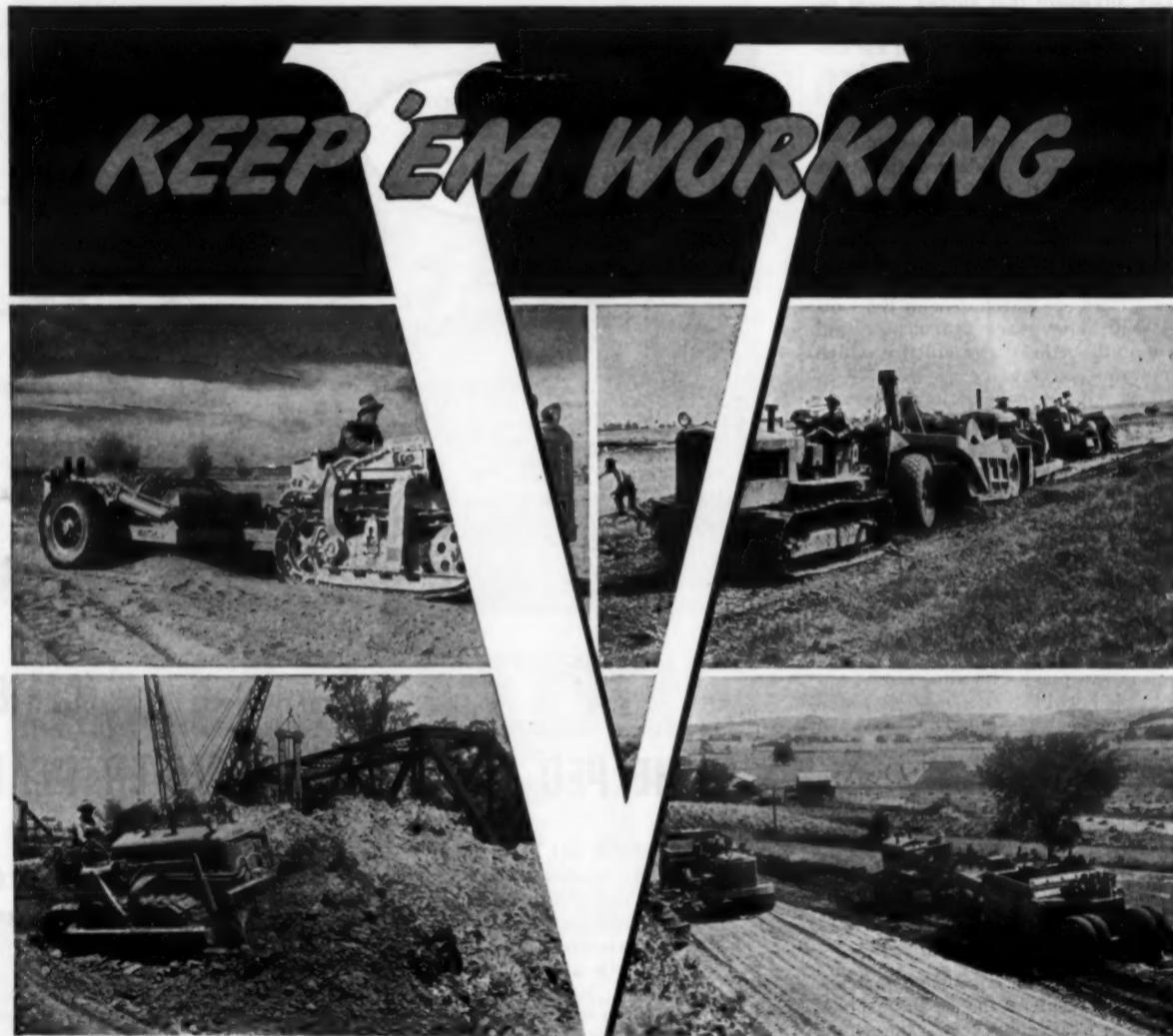
C. & E. M. Photo
Spreading salvaged gravel surfacing between steel forms preparatory to mixing with cement on Indiana's first soil-cement stabilization project near Brownsburg, Ind.

2,000 feet per 8-hour day. The mixing operation was carried on for 8 hours daily.

The Finishing Operation

Immediately following the mixing operation, a double sheepsfoot roller was continuously pulled over the damp material by a Caterpillar D7 tractor un-

(Concluded on page 48)



VICTORY depends upon the maximum output of every individual and every piece of equipment. An hour's time lost is an hour *never* to be regained.

So far as may be consistent with the part assigned to us in the War Program, we are continuing to supply Cletrac owners with essential parts to keep their Cletracs in operating condition.

For your own protection, because of the shortages of critical materials, we urge

you to conserve the equipment you now have.

Inspect it frequently, lubricate it properly, maintain it carefully, replace worn parts promptly, and anticipate your need for repair parts well in advance so that you will lose no time when repairs are needed. Ask your Cletrac dealer for his advice and suggestions.



THE CLEVELAND TRACTOR CO.
Cleveland, Ohio

NEW H-S PORTABLE ABRASIVE CORE DRILL

For heavy drilling of reinforced concrete—taking test cores in concrete highway construction and floor slabs. Drills holes 3½" to 4½" dia. Smaller models down to ½" diameter. Gasoline or electric power. Write for descriptive circular.

HOWE-SIMPSON, Inc.
56 E. Broad St.
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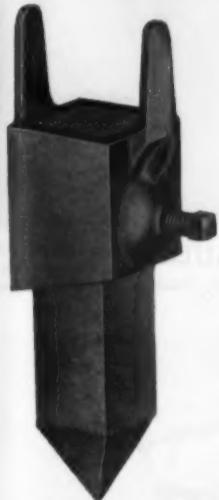
Cletrac Crawler Tractors

GASOLINE AND DIESEL



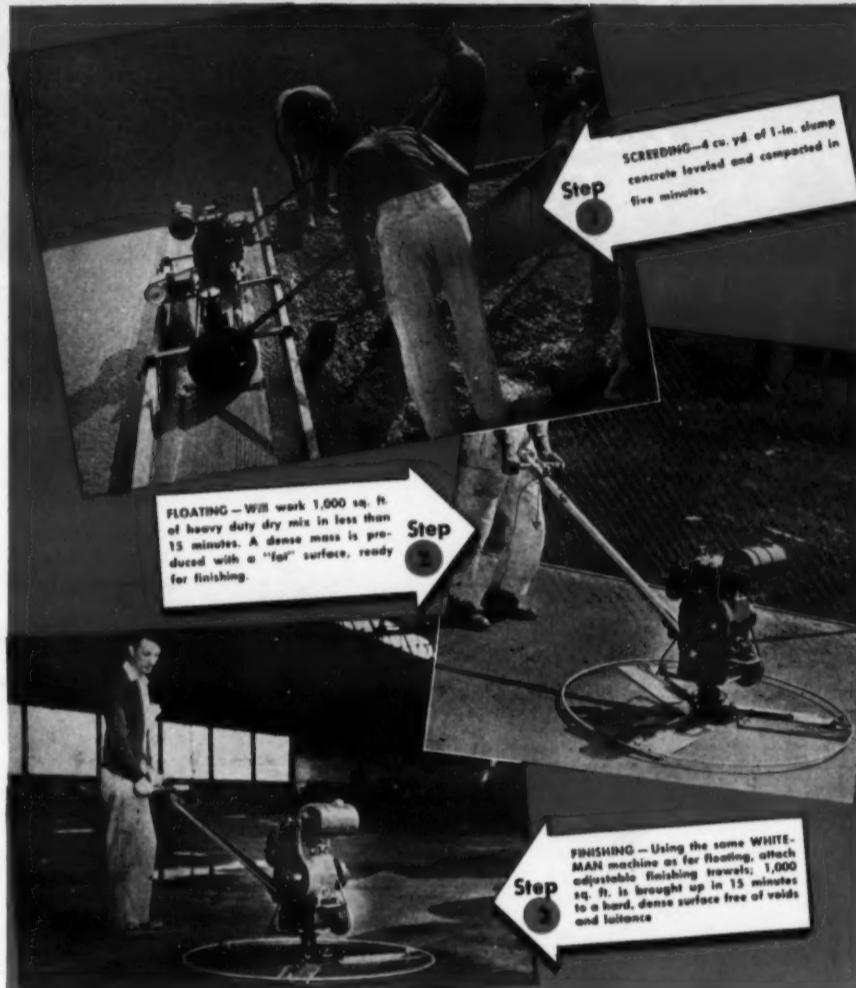
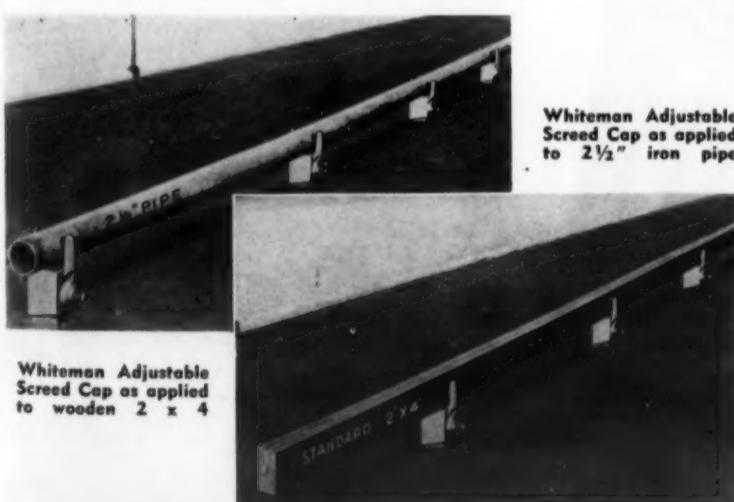
Presenting
the new *Whiteman*
adjustable screed cap

A BRAND NEW IDEA IN SCREED STAKING METHODS, OFFERING NUMEROUS ADVANTAGES, SOME OF WHICH ARE OUTLINED BELOW:



See illustrations below showing how Whiteman Adjustable Screed Caps are applied

1. Contractors can make up their own 2 x 2 wood stakes right on the spot, cut to proper length to suit the actual conditions of each job—using short stakes for hard ground, or longer ones for fills of various depths.
2. This adjustable screed cap is cast of tough malleable iron to give long service.
3. The metal cap is not likely to be broken up by driving, since a wood stake is first driven in, the cap then set on and adjusted to the proper level.
4. For decking, the wood stake is cut to the proper length and fastened to the deck.
5. The use of wood stakes instead of steel effects a conservation of that critical material.
6. Instantly adjustable; unnecessary to disturb the stake itself.
7. Either a wooden 2 x 4 or a 2½" pipe is satisfactory for use as screeds.



The Above Shows the Whiteman "3-Step" Method



SCREEDING

WHITEMAN Rodding Machine has power-driven screeds which simultaneously level and compact the mix while pulled forward by one man. Handles 4 cu. yd. of low slump mix in 5 minutes.



FLOATING

One man operating the WHITEMAN Finishing Machine with "Heavi Duti" rotating trowels covers 1,000 sq. ft. in 15 minutes.



FINISHING

Using the same WHITEMAN Finishing Machine converted by changing to "Finish" trowels, the same operator produces a dense hard, long-wearing surface in record time. No hand work and better surface are the results.

Whiteman MANUFACTURING CO.

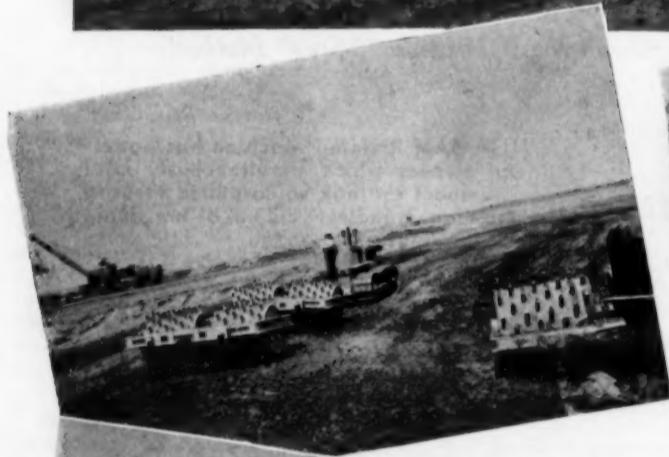
3249 CASITAS AVENUE

Dept. C

LOS ANGELES, CALIFORNIA

Building an Air Field In the Southwest

Wide Variety of Construction
Needed to Place Area
2 Miles Square in Operation
For Air-Force Training



GRADING. Over 2,000,000 cubic yards of dirt was moved at this air field in the grading for the cantonment and the runways, streets and roads. Top photo, a Gar Wood 12-yard scraper pulled by an Allis-Chalmers MD-14 tractor moving dirt in the dust. Upper left, where the earth had little bearing power, the poor soil was removed and replaced with approved material. Here an A-C MD-10 tractor is pulling four Blaw-Knox tamping rollers over a section to compact new material. Above, soil engineers making a test on the character of the new material placed and compacted. At left, the stripping and leveling operation for the apron in front of the hangars was performed by a Caterpillar elevating grader with a 40-inch belt pulled by a Caterpillar D8.



DEEP DITCHES. This Austin trencher is cutting deep trenches, averaging 12 feet wide and 12 feet deep.



LONG HAULS. Where an old railroad cut across the air field, a Lima-made short shot of the obstacle, loading it to a fleet of trucks for long hauls.



HIGH LINES. For high-line transmission, these high-tension towers were set to four eight



ent across the new
made short work
s for long hauls.



CONCRETE. Two 2-bag Jaeger mixers produced concrete for an average 150-foot haul to the forms for a double 4 x 6-foot box culvert 3,750 feet long, starting at the center of the field. Fairbanks wheelbarrow scales were used to weigh the batches.

(C. & E. M. Photos)

POURING. Below, concrete for the 3,750-foot box culvert was wheeled and poured by four Insley rubber-tired buggies. Water for the mixer was furnished by a Rex Speed-Prime pump and the slab concrete was vibrated in place by a Jackson vibrator.

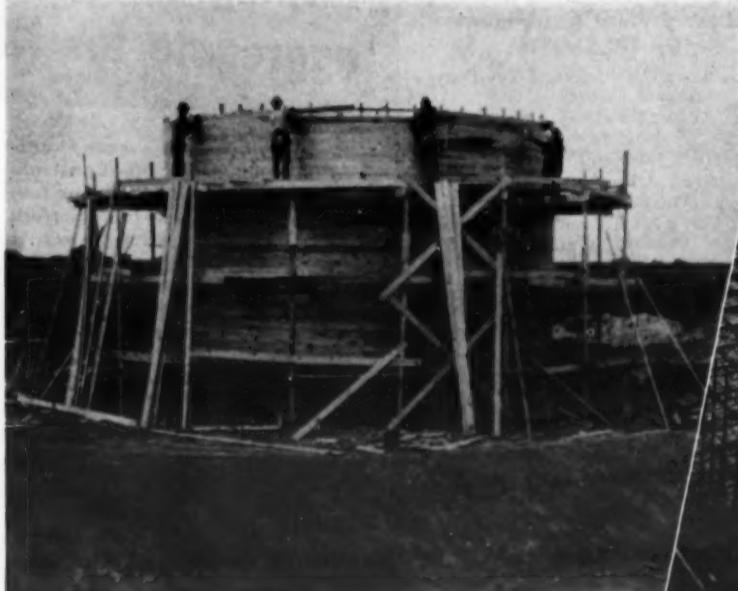


CULVERT. At left, the double
box culvert, 4 x 6-foot long, which carries
the main drainage at the field, as
seen from the top before pouring the
top concrete slab.

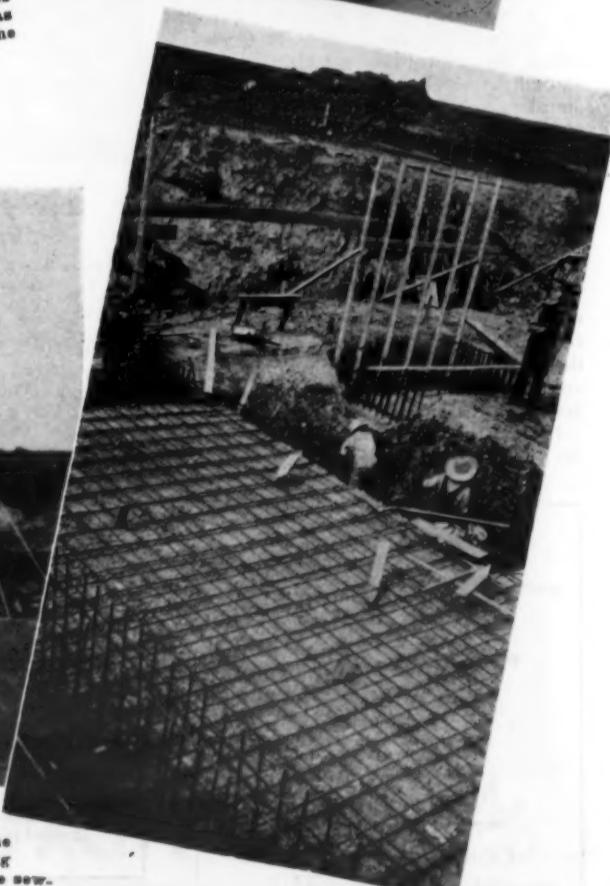
HIGH LIGHTS.
For high-intensity lighting
on the earth-moving opera-
tions, the contractor built
these high wood floodlight-
ing towers, with Caterpillar
sets to furnish power for
the eight big floodlights.



of trenches 3½ feet wide for the concrete sewer
trench per 10-hour shift. With the aid of a
12 feet in depth was excavated.



SEWAGE PLANT. To take care of the sewage at this flying school with its large personnel, an activated-sludge type of sewage treatment plant was built. Above are the forms for the digester and, at right, workmen are placing the reinforcing steel for the bottom and sides of the hopper-bottom settling tanks for the sewage plant.



Speedy Black-Topping Of Army Depot Roads

(Continued from page 13)

a 6-foot diameter drier and a hot elevator delivering to a vibrating screen which separated the aggregates into the same bin sizes. Both plants had Caterpillar 1,700-hp diesel engines for the main drives, and each had its own steam plant. In this manner the plants were entirely separate and independent so that one could be shut down without affecting the other. The Madsen plant delivered 1,000 tons of hot mix in an 8-hour shift, with a maximum production of 1,230 tons in 7½ hours working time.

The mixed batches were hauled to the road for spreading by a fleet of eight 10-wheel trucks which carried from three to five batches per load.

Spreading the Mulch Mat

In preparation for the spreading of the oil mulch or hot-mix, the gravel base was cored out and primed 24 feet wide on the main road with 0.35 gallon per square yard of SC-1, using a 2,000-gallon rented distributor mounted on a Mack truck. This prime was usually allowed to cure for 24 hours and then the hauling trucks could run over it without picking up. However, the delays in the preparation of the gravel base frequently forced the paving contractor to operate over the freshly primed base. At these times a man was kept ahead of the spreader, hand-casting dust over the prime to blot it to prevent picking up.

The oil mulch was spread in a 2½-inch layer by two Barber-Greene spreading-tamping-finishing machines traveling at a speed of 40 feet per minute. In a 16-hour daily run, a spreader laid between 1,800 and 2,000 tons, equal to 12,000 to 16,000 square yards when one ton was laid to cover 7.35 square yards. The hot mix was laid at a temperature of 22° to 275 degrees F. in strips 11 feet wide. The operating crew consisted of the machine operator, two men shoveling from the hopper to the wings when the feeding was not quite uniform, and one wing man checking the thickness continuously on the outside and who raked the joint when working on the second strip. The thickness gage was as simple as could be devised, a piece of wood with a spike driven through to the proper depth. When the spike is placed on the ground, the wood should lay flat on the top of the oil mat.

The surface of the oil mulch was rolled by a single 8-ton Buffalo-Springfield tandem roller. The start of rolling was usually delayed for five or six hours during the hot part of the day to permit the heat to leave the asphalt mix, but in the early morning when it was cool the roller could start within one hour. When laying the second strip on a road, the roller always did the joint rolling within 30 minutes of the laying by running



C. & E. M. Photo
A 10-wheel truck delivering a batch of hot-mix to a Barber-Greene tamping-finisher laying an 11-foot strip 2 1/2 inches thick on an Ordnance Depot road.

most of the rolls on the old strip.

The Seal

The roadways were sealed before heavy traffic began to use them in order to protect the surface and give a non-skid tread. This was done with 0.25 gallon of RC-4 per square yard applied in

10-foot strips and immediately covered with the ½-inch chips at a rate varying from 12 to 20 pounds per square yard, using an All-Purpose spreader.

Personnel

The laying of the 115 miles of black-top paving at this mountain-state Ord-

nance Depot was done by contract under the direction of the U. S. Engineer Department. In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

Rubber, gasoline and oil are vital to Victory. Use them wisely!



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BARTLETT MFG. CO., 3035 E. Grand Blvd., DETROIT, MICHIGAN



TELSMITH PLANT

turning out 1,500,000 yds. of aggregate for NORFORK DAM

Quarry Plant Equipment by TELSMITH

- One 48" x 12' Telsmith Heavy-Duty Apron Feeder
- One 72" x 25' Telsmith Hercules Scalping Screen
- One 16-B Telsmith Primary Breaker
- One 5' x 12' Telsmith Double Deck Pulsator Screen
- Two 30" x 18" Telsmith Double Roll Crushers

Sand and Gravel Plant Equipment by TELSMITH

- Two 60" x 22' Telsmith Hercules Washing Screens
- Two 5' x 12' Telsmith Double Deck Pulsator Screens
- Two 3' x 8' Telsmith Single Deck Pulsator Screens
- One 57" x 12' Telsmith Screw Re-washer
- Four No. 10 Telsmith Sand Tanks
- Four 66" x 16' Telsmith Twin Screw Sand Classifiers
- Five 30" x 56" Telsmith Plate Feeders
- Three 24" x 5' Telsmith Plate Feeders

Total power requirements for both quarry, and sand and gravel plants 1250 hp.

Down in Arkansas, near Mountain Home, the Utah Construction Co. and Morrison-Knudsen Co. are building the huge Norfork Dam. A flood control project, it is also a future source of power. The expected completion date is July, 1944.

About 1,500,000 cu. yds. of aggregate will be needed. To produce it, this combination quarry and sand-gravel plant was designed by Telsmith engineers. And all its machinery, except some conveyors and electrical equipment, is Telsmith-built.

Six 10-yd. trucks haul the limestone rock from quarry to plant. The plant's rock-crushing section turns out 140 cu. yds. per hr. Three sizes of product are made: 6"-3", 3"-1 1/2", and stone dust.

35 bottom-dump cars, each of 140,000 lb. capacity, haul the ma-

terial from the White River gravel bars to the plant. Its sand-gravel section has a capacity of 260 cu. yds. per hr. and makes 4 sizes—3"-1 1/2", 1 1/2"-1/4", 1/4"-4 mesh, and minus 4 mesh sand.

The plant's combined aggregate capacity is 8000 cu. yds. per 20-hr. day. Exceptionally efficient design, combined with automatic inter-coupled controls, make it possible to operate this large and complete aggregate plant with only about six men. Uninterrupted performance of Telsmith equipment has made it possible to exceed the planned concreting schedule.

Today's Telsmith Plants are producing under pressure, to win the war. Tomorrow's Telsmith Plants will do an even better job for you, at still lower over-all costs. Get Bulletin EP-34.



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Charleston, W. Va. Roanoke, Va. Memphis, Tenn.
Wilson-Wesener-Wilkinson Co.
Knoxville and Nashville, Tenn.

Blake Equipment Co., Columbus, Ohio
Brandel M. & S. Co., Louisville, Ky.
G. F. Seeley & Co., Toronto, Ont.

A Three-Span Bridge Of Concrete Arches

Ray Schutt, Contractor. Built Skew Structure Across Walnut Creek On U. S. 40, East of Clay-Putnam County Line, Near Brazil, Indiana

AS a part of the program to improve U. S. 40 between Brazil and Indianapolis, the Indiana State Highway Commission awarded a series of contracts for two 22-foot dual-lane reinforced-concrete pavements on newly graded right-of-way with separate contracts for the major structures, all for completion last year. While considerable difficulty was experienced in grading, due to the almost complete lack of rain during the construction season, the bridge contracts were completed with only minor delays. The contract for a large multiple-arch bridge 1,185 feet east of the Clay-Putnam County line and about 6 miles east of Brazil, Indiana, was awarded to Ray Schutt of Indianapolis, Ind., on his bid of \$95,395.37.

Design

The bridge consists of a central arch span 120 feet long and a side span at each end 50 feet long, all on a 30-degree skew. The bridge carries an 80-foot roadway and two 2-foot sidewalks over Walnut Creek. All footings are carried on pile foundations.

Concrete Plant

The contractor stockpiled the aggregates at either end of the structure and then weighed them in rubber-tired wheelbarrows on a Johnson wheelbarrow scale and mixed the batches in a Jaeger 10-S concrete mixer driven by a Hercules engine. The concrete was placed in the structure by a concrete bucket swung by a Marion crane.

Quantities

The major quantities entering into this structure were as follows:

APPROACH QUANTITIES

Reinforced-concrete pavement 2,019 square yards

Paved ditch 360 feet

EARTHWORK QUANTITIES

Excavation, wet	1,937	cubic yards
Excavation, dry	3,155	cubic yards
Excavation, common	580	cubic yards
Excavation, waterway	200	cubic yards
Special fill	9,150	cubic yards
Special borrow	4,650	cubic yards
Sodding	1,650	square yards
Hand-placed riprap	830	square yards
Waterproofing	2,975	square yards
Special seeding	0.1	acres

STRUCTURE QUANTITIES

Concrete, Class D	1,259.3	cubic yards
Concrete, Class E, footing	943.7	cubic yards
Concrete, Class E, above footing	1,161.6	cubic yards
Concrete, Class D, hand-rail	40.9	cubic yards
Reinforcing steel	259,043	pounds
Piles (total 484)	9,680	feet
Cast iron	2,842	pounds

Highway Construction

In Northwest Mexico

Forty miles of the 158-mile highway between Hermosillo and Sahuaripa in the State of Sonora, Mexico, have been finished and surfacing is being completed on an additional 41 miles. Hermosillo, with a population about 20,000, is situated on the highway between Tucson, Arizona, and Guaymas, Mexico, and is on the route of the Southern Pacific Railway in Mexico. This region produces cotton, minerals, cattle, fruit,



C. & E. M. Photo
Falsework for the central 120-foot span of a 3-arch bridge on U. S. 40 between Brazil and Indianapolis, Ind.

and grain. The new highway is expected to open this extensive agricultural and mineral region of great economic importance.

Sahuaripa lies about 100 miles due east of Hermosillo in a valley of the Sierra Madre Mountains about 2,000 feet above sea level and is noted as a

fruit-producing region. The new highway is finished with concrete bridges in place, except for two which are still to be completed, and a large portion of the surfacing is also completed. At San Jose de Pimas, the first permanent highway maintenance station is being installed.

Complete Paint Dictionary

All users of paint for any type of coverage will find the second edition of The National Paint Dictionary an aid. Within its 224 pages are 200 illustrations and charts, definitions of trade names of raw materials, descriptions of testing devices and other useful information for paint users. The author is Jeffrey R. Stewart, Fellow of the American Institute of Chemists.

This authentic, unbiased volume may be purchased from Stewart Research Laboratory, 1340 New York Avenue, N.W., Washington, D. C. Price \$7.50.

Buy a share in America. Invest in War Bonds and Stamps regularly.

There must be a reason!



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A.G.C. Radio Series Dramatizes Role of Contractors in War

"The construction industry can report to the nation that for the past two years men and management have been driving to new speed records on the greatest construction program the world has ever known—one which is preparing this nation to win the war," stated Dan W. Kimball, President, Associated General Contractors of America, in the first of a series of radio broadcasts by the Association entitled "Construction Goes to War".

Programs are being prepared for broadcast every other week, put on by local radio stations in cooperation with A. G. C. chapters and branches. Employing a cast of professional actors, music, and sound effects, they will dramatize the various types of work performed by the giant construction industry in the war effort. Each broadcast will conclude with a brief message from an outstanding government or industry official.

In his report to the nation at the close of the first program presented the week of November 23, Mr. Kimball said in part:

"The fact that fighting men have been trained in facilities built by contractors and sent overseas, that ships and planes are operating from bases constructed by the industry, and that huge quantities of weapons and munitions are being manufactured in new yards and factories erected by contractors show that we have been doing our job.

"At the same time general contractors and their workmen throughout the country are prepared to aid in civilian defense. Men, management and machines are ready throughout the country to repair any possible damage from bombs, floods, fires, or any accident which can disrupt civilian life.

"Throughout the defense and war period, the Associated General Contractors of America has been fulfilling one of the primary purposes for which it was formed, at the suggestion of President Wilson, following the first World War. The Association and its 90-odd chapters and branches throughout the country have acted as the agency through which the Government and the general contracting industry could cooperate to expedite the war effort.

"In constructing the nation's war plant, in standing ready to help in civilian defense or in serving with the armed forces, construction men of America are adding a glowing chapter to the history of the nation and of their industry. Like their predecessors, they will not rest on their accomplishments but will keep driving ahead until the job is done. Then they will look ahead for bigger jobs to be accomplished."

Tandem-Drive Trucks For Alaska Highway

The Alaska Highway, America's "Burma Road", has already provided many good stories. Here is one that starts in Detroit with an order for 500 Thornton rear-wheel drives for motor trucks. The Thornton Tandem Co., 8701 Grinnell Ave., Detroit, Mich., received the order

RITECURE-G

(Original Concrete Cure with color indicator)

POWER SPRAY MACHINES EXPANSION JOINT

Any type—Any size—Any quantity

THOMPSON MATERIALS CORPORATION

204 West 96th Street, NEW YORK CITY

805 Cortlandt St., BELLEVILLE, N.J.



Enthusiastic workmen wave farewell to the last of 500 Thornton four-wheel-drive truck chassis on the way to the Alaska Highway.

to deliver these units to a prominent construction company for use on the Alaska Highway. The units were to be applied to Ford trucks equipped with 6-yard dump bodies made by the Anthony Co., Streator, Ill.

Delivery was promised by November 7, or in thirty days. Delivery started

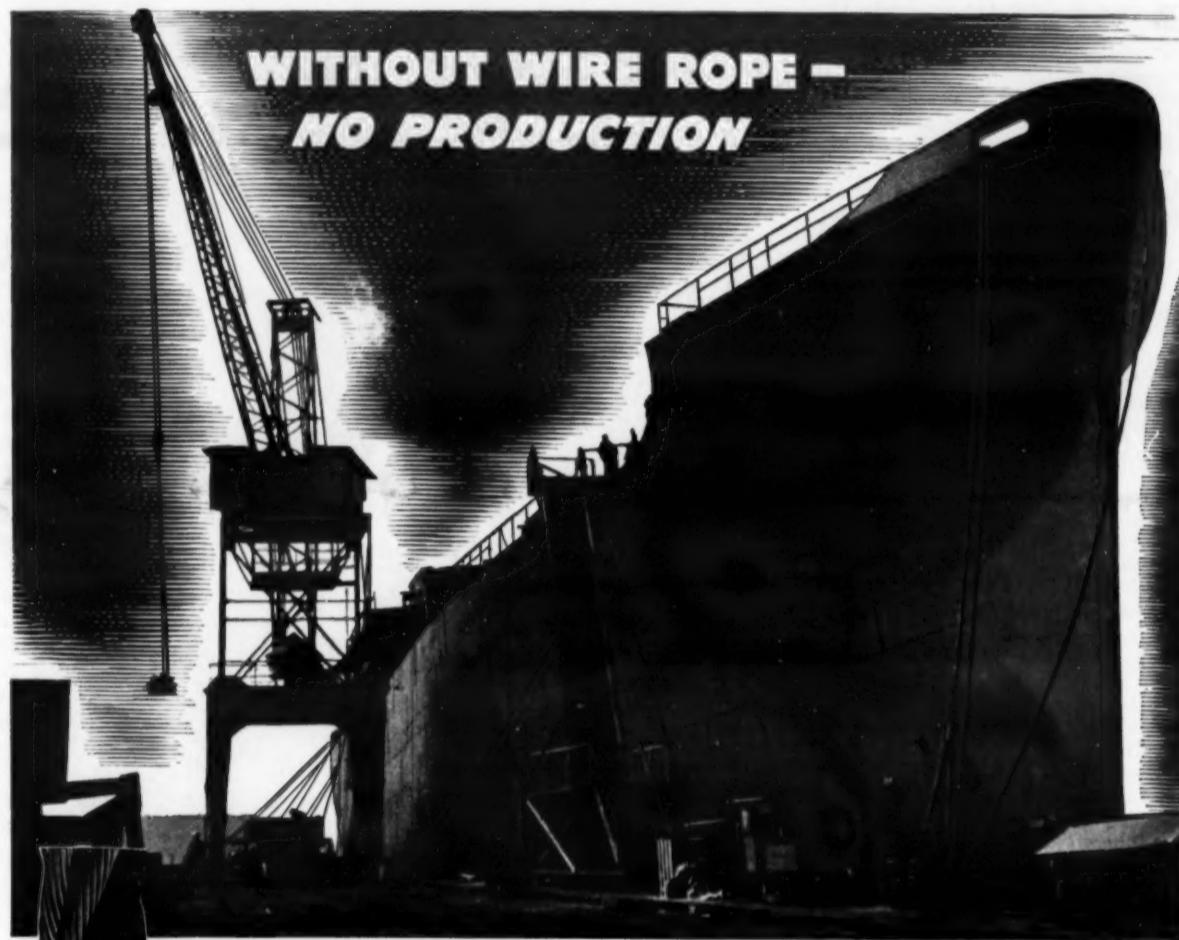
within ten days of receipt of the order and the last job rolled out of the Thornton factory on October 31. The manufacturer believes that the completion of this delivery of Thornton four-rear-wheel drives constitutes a record for production of this type of equipment, transforming Ford trucks into heavy-

duty flexible vehicles for vital construction service.

Hints—Helps—Tips For Crane Operators

The productive life of any excavator depends largely on the care given to it by the operator. For this reason the Shovel & Crane Division, Lima Locomotive Works, Inc., Lima, Ohio, has prepared a booklet "Timely Tips" especially for shovel, dragline and crane operators. Between its covers are 32 pages of useful information pertaining to the servicing and operation of excavation equipment.

Contractors and highway departments should secure copies of this booklet for their operators because today new equipment is difficult to get, and therefore every precaution must be taken to make all shovels, draglines and cranes now in service last as long as possible. Free copies of this booklet will be sent promptly upon request addressed to Lima and referring to this review.



WITHOUT WIRE ROPE— NO PRODUCTION

WITH TRU-LAY *Preformed* WIRE ROPE—
MORE PRODUCTION

Your machines will operate with fewer interruptions for wire rope replacement if they are equipped with American Cable TRU-LAY PREFORMED. That means steadier production; time and money saved; steel conserved. . . . Regardless of application, American Cable TRU-LAY PREFORMED WIRE ROPE invariably lasts longer than ordinary non-preformed rope. It gives you greater dollar value in increased service alone. But TRU-LAY does much more than this. It handles much easier, faster, safer. It is a flexible, tractable, willing-to-work rope—not the kinky, unruly kind that fights the men who are working with it. It spools on the drum better; runs true and straight over sheaves; requires no seizing when cut. . . . Aid production—conserve steel—save money by using American Cable TRU-LAY PREFORMED WIRE ROPE.

AMERICAN CABLE DIVISION

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Tacoma

AMERICAN CHAIN & CABLE COMPANY, Inc.

BRIDGEPORT • CONNECTICUT

ESSENTIAL PRODUCTS . . . AMERICAN CABLE Wire Rope, TRU-STOP Emergency Brakes, TRU-LAY Control Cables, AMERICAN Chain, WEED Tire Chains, ACCO Malleable Iron Castings, CAMPBELL Cutting Machines, FORD Hoists and Trolleys, HAZARD Wire Rope, Yacht Rigging, Aircraft Control Cables, MANLEY Auto Service Equipment, OWEN Springs, PAGE Fences, Shaped Wire, Welding Wire, READING-PRATT & CADY Valves, READING Electric Steel Castings, WRIGHT Hoists, Cranes, Pomes . . . In Business for Your Safety



Changes in Design For Runway Paving

(Continued from page 2)

form setters with four helpers, and then a Caterpillar Fifty tractor pulled a Ted Carr subgrader along the forms to cut the exact cross section for the base of the slab. In order to remove the excess gravel that accumulated against the forms from the cutting by the subgrader, the contractor used an International TD-40 with a small hydraulic scraper to pull out the windrows of gravel. One man, assigned to the grading crew, oiled the forms ahead of the paving operation. The same crew stripped the forms the day following pouring, using a long beam on a pair of wheels to lift the pins and forms quickly.

Batching

The batching was done at a commercial plant operated by the contractor about $\frac{1}{2}$ mile from the air field. The sand was produced at the site of the plant while the gravel for the paving was trucked in to the batching plant and stockpiled. A Koehring crane with a 65-foot boom kept the bins over the Blaw-Knox batching plant filled with the aggregates. A Butler bulk-cement plant was used to unload the cement from trucks and for batching it during 1941 and the early paving in 1942, but because of a lack of shipping facilities for the bulk cement the contractor was required to shift to sack cement for the balance of the 1942 operations.

The batches were hauled to the paver, or pavers in 1942, by a fleet of 22 or 23 trucks, each with two batches per load. When using bag cement, the cement was emptied onto the batch of aggregate at the batching plant, seven bags per batch.

Changes in Joints

The major changes in design caused by the shortage in steel for paving operations was the elimination of the steel for the tie bars across the longitudinal plane of weakness at the center of each 25-foot strip of runway. These were ordered out following the WPB ruling, and a Keystone plastic center joint used instead. This led to another change in the finishing operation. In 1941, the longitudinal finisher carried a cutting wheel which made the slot for the longitudinal center-joint steel strip that was inserted by the finishers and later removed and the slot poured with asphalt. This was not used in the 1942 paving.

The expansion joints were spaced 90 feet apart and $\frac{3}{4}$ -inch premoulded expansion-joint material used between the ends of the slabs. Between each slab a key was formed by attaching a wood insert to the steel forms before pouring. These were omitted at the expansion joints so that the joint material would be continuous across the slab and to

the forms. The contraction joints, in which the steel inserts were placed and later removed for pouring the slot, were spaced 30 feet apart.

Fast Paving

In 1941 the contractor used only one 27-E paver, but to speed the work under

the 1942 "speed up" requirements he used two Koehring 27-E pavers, one on each side outside the forms so as not to disturb the subgrade. These pavers were able to pour an average of 2,350 feet of the 25-foot slab of 8-6-8-inch section in one 10-hour shift, with a "best day" of 2,700 feet. The job was run six days

a week both in 1941 and 1942.

Water for the pavers was supplied by a water truck attached to one of the pavers but supplying both machines. This 1,500-gallon tank truck towed a C.H.&E. triplex road pump with two suction so that when the second of the

(Concluded on next page)

Convoys & Counterweights

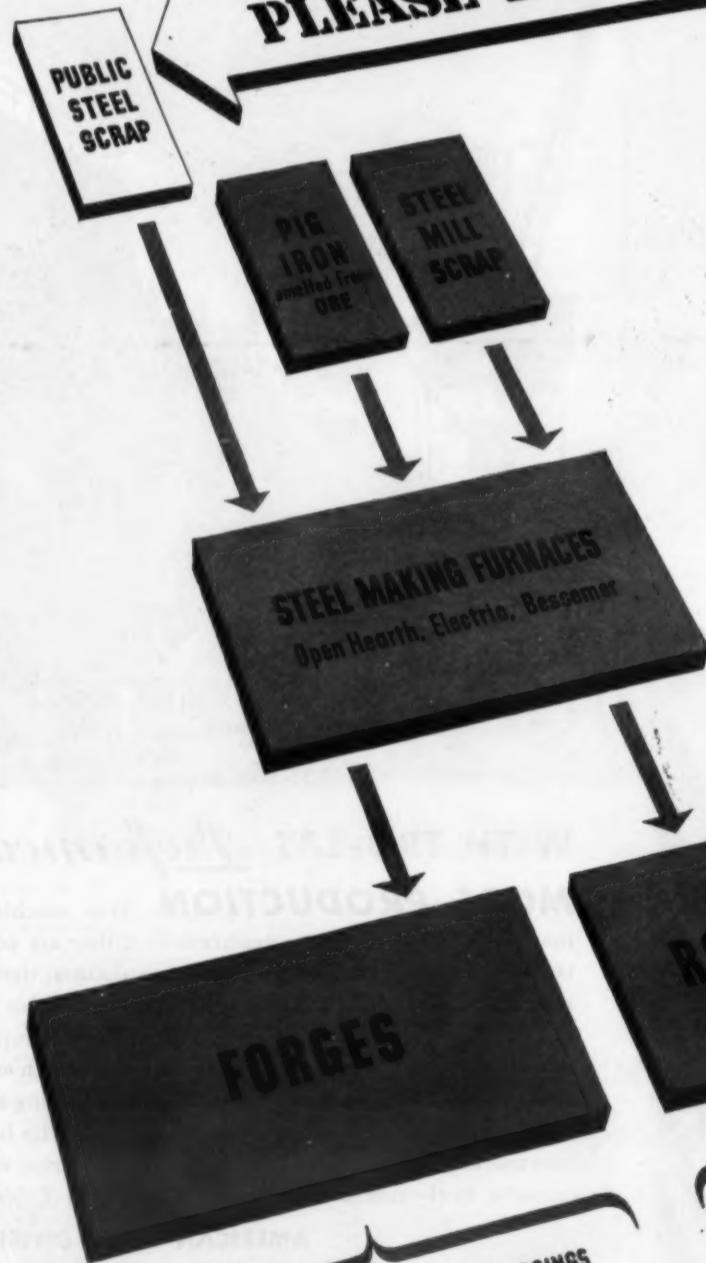
CONVOYING ships act as buffers to protect vital cargoes from destruction by enemy forces. Owen counterweights divert material being handled away from sheaves and cables, assuring that the buckets will "come through" with capacity loads for the longest possible period of service.

THE OWEN BUCKET COMPANY
6030 BREAKWATER AVE. CLEVELAND, OHIO
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A MOUTHFUL AT EVERY BITE

PLEASE HELP FILL THE GAP



Here is the flow chart from Raw Material to War Material.

There is one big gap in the process—public steel scrap. In normal times there is enough, but today scrap piles are low, and winter with its frozen waterways and over-loaded railways looms near.

You can help. The steel-makers need 6,000,000 tons of scrap in the immediate future. Before this appears in print, thousands of collection drives will have done good work. But the furnaces are ever hungry.

Gather up every pound of steel scrap you can find, in your home, your office, your factory. Give or sell it to the nearest outlet. If you can't find an outlet, write us.

Some day there'll be a final bullet. Your scrap metal may be the one to make it.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.



FOR RENT

COMPLETE EQUIPMENT FOR ROAD WORK:

All sizes of Road Forms, Curb Forms, Material and Cement Bins, Finishers, Spreaders, Buckets, Subgraders, Form-graders, Tampers, Pavers, Power Graders, Batch Boxes, etc.

COMPLETE EQUIPMENT FOR BUILDING CONSTRUCTION:

Mixers, Hoists, Air Compressors, Pumps, Saw Rigs, Shores, Column Clamps, Complete Air and Electric Tools, Towers, Welders, Heaters, etc.

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BARS
Aircraft Engine Parts
H.E. Shells
Bayonets
Rifle Barrels
PIPE AND TUBING
Trench Mortars
Aircraft Frames
Refueling Racks

SHEETS
Helmets
Mess Kits
Submarine Net Boxes
TIN, TINNE AND BLACK PLATE
Gas Masks
Ration Cans
Cartridge Boxes

Finishing and Curing Concrete for Runways

(Continued from preceding page)

tank trucks arrived it was immediately attached to the second suction. Then when the first truck was empty it dropped out and the pump took suction from the other. In this manner the pavers were never delayed for want of mixing water.

The crew working at the paver consisted of the men dumping the batches at each paver, the two operators and helpers on the pavers, four puddlers in the mud, and one man cleaning the adjacent concrete when running a new slab against one already poured.

Finishing and Curing

Right on the toes of the puddlers worked a Jaeger-Lakewood double-screed finishing machine equipped with a tamper, with two men shoveling to the strike-off of the finishing machine to keep a full roll of concrete on the screed. One man operated the finisher, which was followed by a Koehring longitudinal finisher carrying the cutter for the center joint during the 1941 operations. It carried it, but did not use it, in 1942.

The six hand finishers then took over the completion of the slab according to specifications. The first two used long-handled floats and pulled two 8-inch transverse belts about 10 feet apart. The remaining four finishers were busy doing the edging and cutting the joints from rolling bridges.

The slab was sprayed with Hunt Process membrane curing compound as the finishing touch to the fast paving process.

Personnel

The 1,250,000 square yards of concrete runway paving at this air field was completed by contract within specified time limits, under the direction of the U. S. Engineer Department. In the interest of national security, the location of and mention of personnel connected with U. S. Army construction are omitted.

Tree Removal-1942 Style

When a contractor is called upon to build a new plant or camp in three months, there cannot be much ceremony in clearing the areas where buildings or roads are to go. One contractor for a new camp recently cleared the entire area of trees with tractors and bulldozers in a remarkably short time. How? That's



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CHRISTMAS SEALS



... Protect Your Home
from Tuberculosis



U. S. Army Photo

A longitudinal finisher giving the final float on a concrete runway.

what we want to tell you.

The bulldozer was angled to cut a V trench on opposite sides of the trees, deeper on one side than on the other and both trenches cutting into the root system. As soon as the trenches were cut, a steel cable was put around the tree

and the tractor pulled away on the side of the shallower trench. The trees came down in 1, 2, 3 order. The deep trench cut through practically the entire root system on that side, making the toppling easier. The bigger the tree, the higher the cable was placed. This system took

care of all grubbing of roots and is less dangerous to the tractor and operator than the older push-over method with the bulldozer against the tree.

Wood Lifting Doors For Plants, Garages

An 8-page bulletin on upward-acting doors in wood and steel, of particular interest to those constructing war plants and garages in areas where snow will prevent easy opening of swinging doors, has recently been issued by Cornell Iron Works, Inc., 36th Ave. & 13th St., Long Island City, N. Y. The bulletin calls attention to the fact that the manufacture of steel doors has been limited by WPB Order L-142, but the wood rolling doors and wood vertical-lift and wood canopy doors, illustrated and described in this bulletin, are recommended and greatly conserve critical material.

Copies of this bulletin will be sent promptly on request by the manufacturer to those mentioning CONTRACTORS AND ENGINEERS MONTHLY.

BUILDING
Nests
FOR OUR
WAR EAGLES

MILITARY airports, — nests for Uncle Sam's war birds, — are today built faster and better even under adverse conditions — than was dreamed possible a short time ago. The great advances made in methods, engineering and equipment are responsible.

Use of the SEAMAN PULVI-MIXER is a striking example of modern methods — an example Uncle Sam was quick to use in our country's extensive war program covering world-wide airport and road construction.

Whatever the job calls for — soil-cement, bitumen, calcium chloride, or any stabilization process with or without binder, — in place mixing operations are handled with a Seaman more quickly and more thoroughly.

With the very thorough mixing obtained with the SEAMAN PULVI-MIXER, roads and airports cost less to construct, stand up longer and require less maintenance. Recognized engineering authorities now realize this fact.

Contractors! Take a tip from Uncle Sam. Investigate the SEAMAN PULVI-MIXER now!

THE SEAMAN PULVI-MIXER

SEAMAN MOTORS
305 N. 25th STREET • MILWAUKEE, WIS.

New Highway Project In Central America

The reconstruction of an important highway into the interior of Honduras has been undertaken under an agreement between the Honduran Government and the office of the Coordinator of Inter-American Affairs. The highway runs between Potrerillos and Lake Yojoa, connecting the Lake Yojoa area with Puerto Cortes, the Republic's principal seaport of the Caribbean.

This cooperative project will improve inter-ocean communication, transportation and the agricultural and economic activities of Honduras, and is now employing more than 1,000 men, most of them recruited from among banana cutters and workers left unemployed by lack of ocean transportation.

Planting in Excess

Today highway officials responsible for roadside improvement are devoting their energies to the preservation of ir-

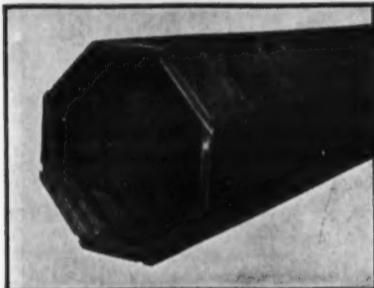
replaceable trees along the highways and to measures to prevent erosion of roadsides. The war has had a salutary effect on the over-abundant plantings evident a few years ago, ending them for the present and leaving the field open for erosion control to reduce maintenance costs.

This summer we ran into a situation that would be distinctly amusing, were it not for the original profligacy of planting. The plantings of shrubs on one rather long roadside improvement project of several years ago were so profuse that, without the knowledge of the official responsible for the planting, the

project has been used by the maintenance forces of the district for several years as a source of material for transplanting to other roads. The original planting has greatly benefited by this thinning-out process.

Rubber is precious—conserve it!

NEW EMERGENCY PIPE



Solves War-Time Drainage Problems

Steel, a critical war material, must not be used in any drainage structure except where engineering integrity demands it. Yet here is a practical war-time substitute. It is the new ARMCO Emergency Pipe, designed by a drainage engineering organization with 38 years' experience.

This completely new design in wood drainage structures meets war-time emergency requirements. Steel bands, metal reinforcing or other critical materials are not required. The semi-flexible design provides ample strength to meet engineering standards. Yet this Emergency Pipe is light in weight for easy handling. Installation cost is low. There is no field assembly and skilled labor is not needed.

On the durability side ARMCO Emergency Pipe performs admirably as a war-time structure. It goes "all-out" in meeting the War Production Board's requirements for substituting non-critical materials wherever possible.

Use the ARMCO Emergency Pipe for essential culverts, storm sewers, underpasses or wherever else drainage structures are needed and vital materials must be conserved. Write for data. ARMCO DRAINAGE PRODUCTS ASSN., 445 Curtis St., Middletown, O.



ARMCO
EMERGENCY PIPE



ROGERS BROTHERS CORP. ALBION, PENNA.

Tanks move doggedly forward wreaking havoc on the enemy but their speed is necessarily slower than trucks and their span of continuous service considerably more limited.

So they crawl up on Rogers Trailers and are moved quickly to the line of combat—or from it when repairs or reconditioning becomes necessary.

Thus, the effectiveness of an important combat unit is increased manifold by these non-combat vehicles.



FOR SALE... CONCRETE PLANT EQUIPMENT

5—**REX 200 Double Pumpcrete Machines** with 50-HP., A.C., 60-cycle, 3-phase 220/440-volt electric motors—complete with Pugmill Remixer with 7½-HP., A.C., 60-cycle, 3-phase, 220/440-volt motors

1—**REX 200 Double Pumpcrete Machine** with 50-HP., A.C. motor and Rotary Remixer

2—**Transfer Car Dollies**—to be used for transferring Pumpcrete units from repair line to active duty

Also have complete supply of 8" Pipe in all lengths and supply of bends and miscellaneous fittings as well as a large supply of repair parts for all units

1—**C.H. & E. Model No. 11, C.A.**, capacity 125 GPM at 320 lbs. pressure—4½ x 5½ single-acting Triplex Road Pump with Waukesha 6-cylinder 45-HP. gasoline engine

1—**Gorman Rupp—R 100**, Triplex Pump on Trucks, 100 GPM at 600 lbs. pressure with Hercules 55/65-HP. gasoline engine

1—**Gorman Rupp—R 125**, Triplex Pump on trucks, 125 GPM at 320 lbs. pressure with Hercules 40/50-HP. gasoline engine

4—**34E Koehring 2-compartment drum concrete mixers**—mounted on standard frames equipped with air compressor for operation of transfer and discharge chute; also Batchmeters, with 3-phase, 60-cycle A.C. motors

10—**Rectangular steel Concrete Towers** arranged in 5 pairs. Height 44'6". These towers were used for Tremie Concreting, being lined up on one side of a R. R. Barge, interconnected and fitted up with stationary and sliding hoppers to feed 15 tremie pipes. The arrangement of each group of towers in 25'6" spacing and additional guides between each group. In between each tower is placed a 3-yd. hopper from which a 3-way chute is placed to divide the flow of concrete into either of three hoppers. Also 15—3-yd. hoppers are mounted on the sliding frames

Five (5) Conveying Systems—Robins Conveying Belt Co.

1—Transfer Conveyor—36" x 202'
1—Stocking Conveyor—36" x 1000'
1—East Tunnel Conveyor—36" x 500'
1—West Tunnel Conveyor—36" x 500'
1—Mixing Plant Conveyor—36" x 256'

These units are complete with chutes and gates and all electrical equipment for its operation. Belting is Equator Brand, 6-ply, 28-oz. duck.

BATCHER PLANT

1—**Butler Bin Co. Four-Compartment, 507-cu. yd. Bin** as per Drawing CM 780-1. Bin bottom arranged to accommodate three weighing batchers, also includes aggregate and cement weighing batchers for 34 E Mixer
1—3000-bbl. cement storage bin
2—No. 44 Cement elevators and screw conveyors, capacity 300 bbls. per hour

1—**14 S. Ransome Standard Building Concrete Mixer** mounted on 4 R.T. Wheels complete with 4-cylinder, 20-HP. gas engine with power loader
2—**Haiss 35'—24" Portable Belt conveyor frames** with 7½-HP. electric motors and with hopper gates

1—**Type B Patterson combined hot water service and storage heater**—120" dia. x 279" overall length. Storage capacity 12,000 gals., 50 lbs. water working pressure. Will heat 12,000 gals. in one hour from 40° to 125° with steam at 100 lbs. pressure tested for 150 lbs. and includes Thermostatic control valve

1—**Cleaver-Brooks O.B. 30—Oilbilt steam generator plant**. Will develop 10,500 lbs. steam hourly from and at 212° F. Approximately 300-HP. Boiler

Bids will be accepted for all or any part of the units offered for sale.

Sale authorized by Bureau of Yards & Docks, U. S. Navy. Any or all equipment can be withdrawn at the discretion of the advertiser.

Other miscellaneous equipment available. Send us your inquiry.

BAYONNE ASSOCIATES

U. S. Naval Supply Depot, Bayonne, N. J.

Phone: Bayonne 3-5800



Another blow against the Axis. Cedar Rapids, Iowa, donates its Civil War cannon to the Scrap Drive.

LaPlant-Choate Aids Local Scrap Drive

A Civil War cannon, which was donated to the National Scrap Drive by the City of Cedar Rapids, Iowa, was cut apart by oxy-acetylene torches supplied by LaPlant-Choate Mfg. Co., Inc., earth-moving equipment manufacturer of Cedar Rapids.

A large crowd gathered in the central square to watch the 15-ton Swedish gray-iron coastal defense gun start on its way to the scrap heap. A truck-mounted crane delivered the pieces to a local salvage concern for shipment to the blast furnaces.

Improved Efficiency Features New Welder

A new alternating-current transformer-type welding machine in which the low open-circuit voltage of 42 volts is automatically and positively maintained has been announced by Wilson Welder & Metals Co., Inc., 60 E. 42nd St., New York City. Two primary coils are used instead of one, with a magnetic contactor in the circuit of one primary. Each primary contributes approximately 42 volts to the total open-circuit voltage which is actually 84 to 85 volts. When the machine is idle, however, one primary is automatically cut out, restricting the open-circuit value to 42 volts. As soon as the electrode contacts the work, the second primary is thrown into the circuit, and if there were not a dead short, the voltage would be 84-85 volts.

When the operator draws an arc, the open circuit potential of 84-85 volts enables him to establish his arc quickly and to begin welding. When the weld is completed and the operator pulls out or lengthens his arc, the arc voltage rises. The moment it reaches 45 volts, the contactor opens and cuts out one primary, leaving only 42 volts in the open circuit.

Other improvements in the new Wilson Bumble Bee include power factor correction on all four sizes, 300, 500,

750 and 1,000 amperes. With the new wiring arrangement, the capacitors are cut out when the machine is idle, thereby conserving power and reducing costs.

Full information regarding these new welders may be secured direct from the manufacturer by mentioning this descriptive item.

Craig to Make S. A. Tour

The Cleveland Rock Drill Co. and The Cleveland Pneumatic Tool Co. both of Cleveland, Ohio, have designated Robert Craig, until recently District Manager for both companies at Salt Lake City, Utah, to make a trip through South and Central America, visiting distributors and generally looking after the interests of these affiliated companies. Mr. Craig's trip will include San Juan, Puerto Rico; Port of Spain, Trinidad; Santiago, Chile; La Paz, Bolivia; Guayaquil, Ecuador; Medellin, Colombia; and then Panama City and Colon, Panama.

Mr. Craig has been stationed twice

previously in Western South America and is considered by the companies he represents to be capable of carrying on

commercial relations with our Latin American neighbors in the best traditions.

Extra Heavy, Olive Color SLICKER COATS

Here's a rare opportunity to buy the finest slickers ever manufactured!

LOOK AT THESE FEATURES
CORDUROY COLLAR • BRASS BUCKLES • CLASP
BUTTONS FOR SLEEVES AND INSIDE COAT • NON-
RIP POCKETS • REFLEX EDGES KEEP WATER FROM
RUNNING INTO FRONT

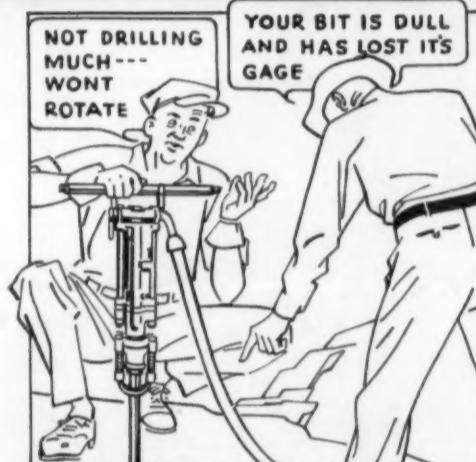
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While They Last . . . \$3.50
Medium or Large Size **3** EACH
Order Direct From Dept. CE

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Shannon & Co.
BROAD & HUNTINGDON STS.
PHILADELPHIA PENNSYLVANIA
"THE OLDEST EQUIPMENT HOUSE IN PHILADELPHIA"



HOW TO KEEP YOUR ROCK DRILLS on the Job



Don't use dull drill steels—When the bit, from wear, or improper sharpening loses its gauge, it will no longer be free in the hole and the blows of the hammer wedge it tightly, greatly slowing up, if not entirely stopping the progress of the drill. Never use dull steel. You get no drilling to speak of, and you put your machine in the repair shop besides.



Keep the drill tightened up—Watch the nuts, bolts, and oil plugs on your machine, particularly the side rods. Permitting them to work loose allows excessive play between the parts, and this means early wear and loss of air as well.



Steel Puller will work perfectly if kept tightened up—Some steel pullers—those on Cleveland Sinkers, for example—are so constructed that it is easy to take up the looseness which may be present when the springs have taken a set. Keeping all these parts tight will make the machine last longer.

★ Another in a series of advertisements telling how to get maximum work out of your drills, with minimum expense for repairs and compressed air. Send for the whole series, ask for "Cleveland Cartoons".

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Special Equipment
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Write for descriptive catalogs.

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THE CLEVELAND ROCK DRILL COMPANY

Subsidiary of The Cleveland Pneumatic Tool Company

CABLE ADDRESS: "ROCKDRILL"

CLEVELAND, OHIO

LEADERS IN DRILLING EQUIPMENT

Lubricants and Fuels On Today's Construction

Two important items in the efficient operation and maintenance of construction equipment on today's important war projects are the proper fuels and the proper high-quality lubricants. In a well-illustrated bulletin, "Ahead of Schedule on a 20 Billion Dollar Job", Gulf Oil Corp., Gulf Bldg., Pittsburgh, Pa., discusses these two phases of equipment operation and depicts airport,

highway, flood-control and war-plant construction, well distributed throughout the United States, with comments on the fuels and lubricants used.

Copies of this booklet will be mailed free to readers of CONTRACTORS AND ENGINEERS MONTHLY writing direct to Gulf and mentioning this review.

Concreting This Winter?

Military construction has not yet come to an end, so contractors must be pre-

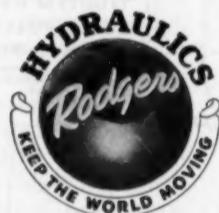
pared to continue concreting throughout this winter, with all of the hazards attendant to such work. On large concreting jobs aggregate bins must be heated with steam plants requiring large steam boilers. On the smaller jobs, aggregate can be heated with steam grids beneath the stockpiles and the mixing water brought to high temperature by means of a booster water heater. Then the concrete must be kept hot in the drum of the mixer, and that is where the big torch burners come into play.

Whether it is a torch burner, a booster water heater or a salamander for keeping concrete warm during curing under some enclosure, such as tarpaulin, information on heating equipment will be found in Bulletin P-11 of Littleford Bros., Inc., 485 E. Pearl St., Cincinnati, Ohio, which will rush copies to you immediately upon request.

Are you and the members of your organization investing 10 per cent of their income in War Bonds? If not, start NOW!



RODGERS KEEPS 'EM CRAWLING



Manufacturers of:
UNIVERSAL HYDRAULIC PRESSES
TRACK PRESS EQUIPMENT
HYDRAULIC KEEF BENDERS
HYDROSTATIC TEST UNITS
POWER TRACK WRENCHES
PORTABLE STRAIGHTENER
FOR KELLY'S AND PIPE

ON THE FAR FLUNG BATTLE FRONTS, on the new Alaskan Highway, or a little road construction job down in Arkansas, Rodgers Hydraulics are doing their bit. * Wherever crawler type tractors tussle with heavy road building or construction jobs, Rodgers Hydraulic Track Presses furnish speedy repair of vital track equipment. Wherever heavy machinery operates — automotive, construction, factory or power plant — Rodgers Universal Hydraulic Presses

will do a pulling, pushing or lifting job with speed, power, durability and safety. * To meet the demands of our times, we suggest the Rodgers "Retractable Jaw," the greatest improvement in track servicing equipment, approved and recommended by the Engineering and Service Departments of every crawler tractor manufacturing company. * *If it's a Rodgers, it's the best in Hydraulics.* Rodgers Hydraulic Inc., St. Louis Park, Minneapolis, Minnesota.

Rodgers HYDRAULIC Inc.

Clearing the Snows From Colorado Roads

(Continued from page 10)

The Highway Department also uses a Coleman rotary widener which is mounted on a two-wheel trailer and pulled by a four-wheel-drive truck. The widener has a 42-inch diameter snow fan powered by a 126-hp gas engine, and the unit is steered by the operator so that it can be trailed off to one side of the truck. The motor and snow fan are pivoted in the frame so as to be shifted to either side of the road. The truck runs alongside the high ridge of snow that has been pushed to the side of the road and built up 6 to 10 feet high. The rotary is then shifted to the side enough to hold the snow fan into the snow ridge which is picked up by the snow fan and thrown clear of the highway, thereby widening the roadway to its original width. The widener has a slice bar attachment ahead of the rotary snow fan to cut down the overhanging snow which is higher than the fan.

Wings are used on the trucks or graders to push over the tops of the piles of snow accumulated from earlier plowing to make room for more snow toward the latter part of the season.

Equipment Maintenance

The Maintenance Division of the Colorado State Highway Department is also responsible for the care of all the state highway equipment. In these days this becomes a trust that is close to sacred when much of the equipment that is essential to the continuance of good



Colorado State Highway Dept. Photo

A 3-auger Sno-Go with a 275-hp motor mounted on a 175-hp truck.

roads cannot be replaced. The Division is doing all possible, with welding in particular, to lengthen the life of all pieces of equipment. Such things as snow blades and grader blades are being prolonged in service by welding together, but the threat of a reduction in welding rod of the types needed causes more heart aches.

Personnel

This article is based on an interview granted by Douglas N. Stewart, Superintendent of Maintenance of the Colorado State Highway Department, of which Charles D. Vail is State Highway Engineer.

"E" Award for Macwhyte

Employees of Macwhyte Co., Kenosha, Wis., manufacturer of wire rope and cable, slings and accessories, are working harder than ever these days, because they recently received the Army-Navy "E" Award.

A Heavy-Duty Metal For Cranes, Tractors

A metal made in six grades of graduated physical properties to meet the varying requirements for modern construction equipment has been developed

by Ampco Metal, Inc., Milwaukee, Wis. It is a high-iron alloy with copper and aluminum possessing high tensile strength, great wear resistance, and abrasion resistance.

Among the places where Ampco metal is now used in road-building and other heavy construction equipment are: boom hoist drum bushings, front and rear drum bushings, washers, pilot plates, worm gears, idler sprocket gears, cams, thrust washers, converter nuts on shovel hoists, universal joints, boom sleeves, draw bar pivot bushings, shifter shaft bushings, shifter ring bushings, hoist drum bushings, friction clutches and sleeves. On dump trucks, Ampco metal is used in the pistons on the hoist, rings, spacers, body dump link bushings, and draw bar pivot bushings. In truck transmissions it is used in the radius rod bushings, thrust washers, and in the transmission bushings.

There are many other applications also covered in literature which will be furnished promptly by Ampco to readers mentioning this review.



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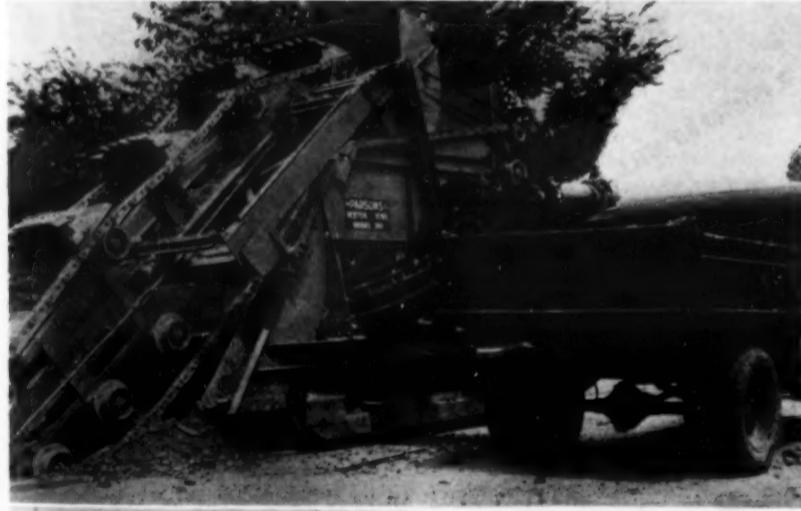
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QUICK SHIFT CONVEYOR

The arc type discharge conveyor on a Parsons Trencher shifts through the machine by power so that spoil may be deposited on either side of trench as desired by the operator. This shift may be made in less than fifteen (15) seconds so that an obstruction can be cleared

while machine is digging—a most important feature when operating in close quarters. The shift is by worm and worm gear which automatically locks conveyor in any position.

The conveyor is permanently located for height and does not vary when boom is raised or lowered. Trucks may, therefore, be loaded at fixed position discharge height.

The spoil to be retained for backfill is piled on opposite side of trench by merely moving a lever to reverse the direction of belt. Investigate Parsons superiority before you buy.

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TRENCHING EQUIPMENT



When desired a conveyor extension may be added to facilitate loading higher trucks or keep spoil bank farther from trench.

★ ★

At least 10% of The Parsons Company payroll is invested in Victory Bonds.



The Texas Highway Department's magnetic nail picker in operation.

Nail Picker Salvages Metal and Saves Tires

(Continued from page 27)

tegrally. The generator is rated at 125 volts, 32 amperes direct current, compound wound and operating at 1,050 rpm. The generator and generator motor are separate units, the generator being driven by a V belt.

The magnet cases are made of 2 1/4-inch channel iron, 48 inches long and 15 inches wide, with the ends closed by welding in 1/2-inch plates to attach the brass bottom plate. Insulated terminal studs project through the cases at the coil ends for leads from the generator and coils. These specifications cover one magnet, but two are used in series, giving an overall effective "drag" of 8 feet over the highway or street. A light angle-iron frame extends around the bottom of the assembled magnet to protect the screws and edges of the brass plate.

The core of the magnet is of ordinary grey iron, 36 inches long, 2 inches wide and 2 1/4 inches thick, and is rounded at the ends. It is attached in the center and is parallel to the case. The coil winding for one magnet section requires about 160 pounds of No. 8 square Fiberglass-insulated copper wire, 362 turns to the coil. The coil is wound under tension over an oak core pattern which is slightly oversize to allow for taping with 5/8-inch linen. It is taped tightly after winding, soaked thoroughly in varnish, and then baked for 24 hours until very hard and dry. This curing process forms the coil into a dense mass and prevents the turns of copper from shifting or loosening due to expansion and contraction caused by temperature changes. After the coil is placed over the core in assembly and before the brass bottom plate is attached, a gasket of ebony asbestos of the same dimensions as the plate is fitted. This serves to pre-

vent moisture entering the cases and also cushions the coil against shock.

The magnets are suspended from the rear of the truck by means of an 8-foot length of 4-inch pipe fitted into heavy strap hangers which are bolted to the channels of the frame ends of the truck. Each hanger is bolted to the top of the frame, goes around the pipe, and is then bolted to the bottom of the frame. The pipe fits snugly in the hangers so it will rotate without excess play. Stop collars are used to prevent slippage. A worm and gear is used to raise and lower the magnets. The gear is in the center of the pipe and the worm shaft extends through the floor of the truck with a hand wheel attached for turning. A section of angle iron is welded about 6 inches from the ends of each magnet section to which is attached a short length of heavy chain in a V, the apex link of which is used to secure a pliant 5/8-inch wire rope. The wire ropes are secured to the pipe with J-bolts. Clearance lights are placed in slots at the ends of the 4-inch pipe for safety at night, and red flags are placed at each end of the magnet for safety in the daytime.

This article is based on information furnished by M. B. Hodges, Maintenance Engineer, and Cal Speedy, Special Assistant, Texas State Highway Department.

Saving 20 Per Cent In Electrode Usage

If vital war production is not to be impeded by lack of arc-welding electrodes, the utmost cooperation of both electrode manufacturers and users to make the most of the electrodes being produced is essential, according to H. O. Westendarp, Welding Engineer, General Electric Co., in a talk before the Cleveland Section of the American Welding Society. Electrode manufacturers are working around the clock, seven days a week. In addition, bare portions of electrodes have been reduced to a minimum in order to lower stub losses, and development laboratories have improved coatings to reduce spatter loss.

The big job of getting the most out of available electrodes, however, Mr. Westendarp declared, is up to users of arc welding. In this connection he suggested the following six-point program.

1. Select the largest-diameter and greatest-length electrode that can be applied successfully. This not only speeds up deposition rates of weld metal but also results in a decided increase in the tonnage of electrodes that can be extruded per day from existing facilities.

2. Joints to be welded must have good fit-up as excessive gaps are prolific wasters of metal.

3. Use the proper amperage for the job—avoid excessive currents and long arcs. There is a current beyond which the deposition rate is decreased and electrode consumption is increased.

4. Don't bend electrodes except when absolutely necessary. Bent electrodes destroy the electrode coating and result

in excessive stub losses.

5. Produce true fillet welds having equal legs—this is a function of the proper type of electrode and of welding technique.

6. Use each electrode down to the point where the full coating diameter ends.

... Le Roi Engines are standard equipment on many types and makes of construction machinery

The heart of any machine is the power unit that drives it. That is why it pays you to look for Le Roi engines on equipment you buy. Through years of experience in heavy duty service—practical design and quality manufacture—extra features that reduce maintenance and operating costs and safeguard the life of the engine—Le Roi gives you extra dependability and saves you money. Get Le Roi's on your next equipment, for performance you can be proud of. Le Roi Company, Milwaukee, Wisconsin.

E-11

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Kwik-Mix Bituminous Mixer equipped with Le Roi Power Unit.



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DOING THEIR SHARE!

Translode Angle-Unit Expansion and Keylode Contraction Joint are contributing to the War Effort. Fifteen to twenty percent more steel can be diverted to more vital needs by using Translode and Keylode in place of the conventional Dowel Bar Joint.

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BITUMINOUS DISTRIBUTORS
E. D. ETNYRE & CO., OREGON, ILL., U.S.A.

Care of Equipment In Ohio Rural County

(Continued from page 23)

tions required it, the surface was sealed with 0.2 gallon per square yard of RT-6 tar. Then 1/2-inch screen size aggregate was spread over the material at the rate of 18 pounds per square yard by a Buck-eye chip spreader attached to the rear of a truck which was backed over the surface so that it always ran on chips and not on the bituminous seal. The surface was then broom-dragged to complete the uniform distribution of the chips and rolled by the 7-ton tandem roller.

The County System

Brown County contains 16 townships and is 496 square miles in area. There are 250 miles of road in the county highway system. The county has nothing to do with the state highways in Ohio, but Brown County blades most of the town highways without cost to the towns, using motor patrols.

The County Engineer in Brown County, in accordance with the state law, is elected for a four-year term. John R. Kay, the present County Engineer, is now serving the second year of his second elected term as County Engineer.

Equipment and Repair

For a rural county with no excess of highway funds Brown County has a well-selected adequate equipment roster as follows:

- 1 International pick-up truck
- 1 Chevrolet 1-ton flat body truck
- 2 GMC 1 1/2-ton dump trucks
- 2 Dodge 2-ton dump trucks
- 1 International 2-ton dump truck
- 4 Adams power graders with 10-foot blades
- 1 Allis-Chalmers pulled grader
- 1 Galloway pulled grader
- 1 Allis-Chalmers Model L tractor
- 1 Cietrac 55 tractor
- 1 McCormick-Deering 15-30 tractor
- 1 Northwest 1/2-yard shovel with skeleton trailer
- 2 International tractors
- 1 Pioneer 10 x 20 jaw crusher with screens
- 1 Jaeger 1-bag mixer
- 1 Gorman-Rupp 2-inch pump
- 1 Barnes 1-inch pump for the concrete mixer
- 1 Adams multi-blade drag

There are two bridge crews, one with a 1 1/2-ton GMC truck and the other with a 2-ton Dodge truck. There is no pile driving equipment as this is a limestone country where piles are not called for.

The county has two pusher-type blade snow plows for 2-ton Dodge trucks and, according to Mr. Kay, really needs a

couple of others when there is snow, but they have had only one winter in the last five when the snow plows were used. Although not adequate for drifts, the power graders have been used effectively in removing light snows from the roads, particularly when icy conditions were threatened.

When one visits the Brown County Fair Grounds, at the left of the main entrance is a long white wooden shed bearing in black letters at the front the following sign:

1939
Brown County
Road Implement Storage
And
Annual County Fair

This building is used as a cattle shed during the one week of the County Fair, but during the other 51 weeks is used as a storage shed for County Highway Equipment. At the left in a section paved with a concrete floor is the repair shop and at the right a separate room, which can be locked, for the storage of gas and oil with the dispensing pump inside the room with a hose long enough to fuel equipment outside.

In the small shop minor repairs are made throughout the year and in the winter the regular crews work on the equipment so as to hold the organization together. Major repairs are done in local shops. The small shop is equipped with a garage compressor, a pressure greasing outfit, a power sharpener for mower blades, a 2-ton chain hoist on a trolley running along a 20-foot monorail, and on the walls are hung spare gaskets, fan belts and other repair items which are needed frequently and quickly.

The county has no rented garage or storage sheds in other parts of the county. The operators keep the patrol graders in their own barns or in local garages at no cost to the county. Gasoline is purchased locally on requisition, the men being instructed to purchase from a different service station each week. The County takes off the Federal 1-cent gasoline tax, but not the Defense Tax.

Financing the Department

The Brown County Highway Department in 1940 received \$122,401.28 from the state gas tax and motor vehicle license taxes, of which about \$45,000 was from the latter. This money is distributed according to the number of vehicles in the county. There is no real estate tax for highway purposes because of the constitutional 10-mill limit on taxation.

Practically all of the funds which can be raised in this rural county with a low assessed value are required to go for educational and other purposes. All of the state gas tax money, however, goes to highways, as the salary of the County Engineer and one-third of the salaries

of the office force and deputy is taken from general county funds.

A timely and valuable article on Missouri's method of prolonging the life of cracked pavements will be described in our January issue.

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And that is what our long-time customers want us to do. They know it means sacrifice and hardship but that is to be expected when our No. 1 job is so vitally geared to victory itself.



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With everybody plugging for victory in '43, you can help Uncle Sam speed up the movement of materials by increasing your trucking efficiency on jobs that require hand loading.

Do you want to know how? It is no military secret! Just mount a Brooks LOAD LUGGER on the chassis and use 5 or 10 detachable buckets with each unit. Your trucks can handle more payloads per day because the work is continuous...no idle time, standing by, waiting for loadups.

Remember:—The more buckets you use per unit, the fewer trucks you need per job.

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THE HAND OF THE SPECIALIST IS OFTEN
REVEALED IN LITTLE THINGS
"of BIG importance"



The cooling tower for the compressor plant at Keswick Dam, part of the Bureau of Reclamation's Central Valley Project in California.

Concreting Set-Up For Keswick Dam Job

(Continued from page 19)

Concreting

Aggregates for the concrete are secured from the processing plant of the Columbia Construction Co. at Redding, which has the contract for supplying Shasta Dam, and are transported by hired trucks, the trucking company using a fleet of ten 5-yard to 7-yard trucks on a 15-mile round trip haul. The cement, a low-heat type, is also trucked in, from the silos at Redding. Arriving at the dam, the aggregates are dumped into storage bins from a ramp and are transported from the bins to the mixing plant by a short belt conveyor.

In the mixing plant are a standard Johnson weighing and batching system and two Koehring 2-yard mixers delivering to a centrally located chute which leads to the bucket landing. The cableway buckets are loaded from a landing which is very close to the mixing-plant structure and the contractor has worked out a novel way of spotting the buckets on the landing without having a man stationed there to swing them into place. Using vertical T-rails set in a circle and slightly flared at the top, a sort of funnel-shaped guide was built, into which it is easy to swing the bucket from the cableway. The bucket then slides down to the landing on the correct spot to receive its load from the chute. Steel not being available, the head and tail towers of the cableway are constructed of wood.

The dam is somewhat similar in construction to its big brothers of the Central Valley Project. It is being built in blocks, with a cooling system; contraction units grouted and the usual grouting precautions taken in the foundation rock, with 30 to 75-foot grouting holes being drilled for the low-pressure grouting. One main gallery traverses the dam, and from that deep grouting will be done later.

Equipment and Personnel

Work on Keswick Dam is well ahead of schedule. Although a job of some

magnitude, it is being done with a moderate amount of equipment. The major equipment includes a Northwest 80 2 1/2-yard shovel, a Bucyrus 43-B 1 3/4-yard shovel, six 20-yard Mack dump trucks, two Ingersoll-Rand and one Gardner-Denver wagon drills, three Caterpillar D8 and one D4 tractors; two 15-yard Carrigans, two Ingersoll-Rand Type 10 1,100-cfm stationary compressors, another Type 10 of 650-cfm capacity, and one I-R 500-cfm portable compressor on a pick-up truck, six Chicago Pneumatic concrete vibrators, one No. 6 Gardner-Denver and one No. S54 I-R drill sharpeners, five Gar-Bro 1 to 6-yard buckets, a Lidgerwood cableway, a Johnson weighing and batching system, and two Koehring 2-yard mixers.

All the buckets were brought down from Mud Mountain in Washington. The contractor's aim was to have a large variety of sizes adapted to any special job of pouring as well as for the blocks of the dam. They are quickly interchangeable and the contractor has found it decidedly a time saver always to have the right bucket for a given job.

The Atkinson Kier Co. is made up of George L. Atkinson and three Kiers, W. E., E. L. and J. A., who were identified with Mason, Walsh, Atkinson, Kier, contractor for the base of Grand Coulee Dam. R. J. Jenks is Job Engineer and E. M. Jennett, Resident Engineer for the contractor.

For the Bureau of Reclamation, the work is under the direction of Ralph Lowry, Construction Engineer at Shasta, with John J. Welch, Principal Inspector, and C. M. Jackson, Resident Engineer.

A Casting Repaired By Careful Welding

When two large vertical cracks appeared approximately opposite each other in a 30-ton cast iron crusher cone and spider base recently, they were repaired by shrinking two bands of steel around the entire circumference of the crusher cone at the top and bottom. This was done at a total repair cost of \$1,181.40 while a new cast iron crusher would have cost around \$9,000, with delivery uncertain. The work was done by the Material Service Corp., Lockport, Ill., under the direction of Norman E. Smith, Welding Supervisor.

The lower band was made from 4 x 6-inch steel and was 10 feet in diameter, while the upper band, made

from the same stock, was 15 feet in diameter. Each band was constructed in halves which were joined by welding with two 60-degree single "V" vertical butt welds.

The welds on each band were run simultaneously by two operators to equalize the contraction and expansion.

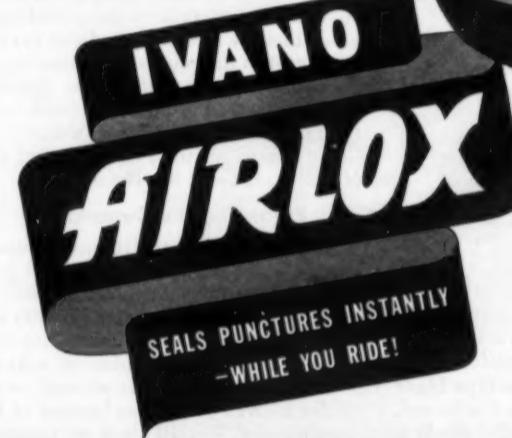
The bottom band was welded first, and then was heated by four oxy-acetylene torches when the operators proceeded to weld the upper band. As each band expanded, shim stock was inserted between the band and the casting around its entire circumference to apply the "squeeze" as the bands cooled.

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You're taking a big gamble in driving trucks without AIRLOX. A puncture today is serious business. Your trucks may be on their last set of tires. It might be years before you can get more. One puncture usually ruins a tube beyond repair. So why take the chance of putting your trucks out of operation and endangering the lives of drivers. AIRLOX is cheap tire and life insurance. It seals puncture as the truck is being driven. One treatment effective for years in all temperatures. Arrange to protect all the tires on your trucks with AIRLOX. If you are unable to obtain AIRLOX from your regular automotive jobber, order direct.

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C. & E. M. Photos
C. Don Hayes, Supervisor of Equipment, Arkansas State Highway Department; a new warning sign built at the Central Shops; and part of the scrap metal gathered from shops and yard at North Little Rock.

Wooden Road Signs Made in Ark. Shops

(Continued from page 29)

by the men when the stripe is dry. These are fed down a chute from a truck following the striping and are painted red all over by spray painting to make them readily visible.

New Signs and Old

Of course the old signs along the state highways are of sheet metal as the most durable material. Many of these have to be replaced yearly and, with no sheet metal available for this purpose, the sign shop has come through with excellent imitations in wood, even with the reflector buttons. A recent campaign for reducing accidents within the limits of

Little Rock, where thousands of soldiers congregate from the nearby camps on weekends as well as through the week, with the attendant vehicular traffic, led to the introduction of a great number of "Stop" signs on state highways within city limits. These were all built in the sign shop, using wood and reflector buttons. They were installed by the city on steel posts.

A novel "Men Working" sign deserving of description was developed in the Central Shops of the Department. It was made when sheet metal was available, but might well be made of wood. The sign, 8 inches wide x 3 1/2 feet long, of sheet metal is painted yellow with the words "Men Working" running from top to bottom. It is bolted to a piece of strap iron, with top and bottom each welded to a piece of conduit which acts as the stanchion. Being narrow, the sign does not obstruct traffic and consequently is not frequently knocked

down. The base is the brake drum of an old Ford truck and the conduit pulls out of the base for ease in packing in the truck. Similarly the flag staff at the top, carrying a red flag, is removable. A handle on the base makes it easy to pick up and move.

Some of these signs have been made with the stanchion welded to the base and a hook near the top so that they could be hooked to the tail-gates of the trucks when moving instead of loading them into the trucks.

Personnel

The Arkansas State Highway Department has its headquarters at Little Rock and the Central Shops at North Little Rock. The shops and the care of all equipment of the Department are under the jurisdiction of C. Don Hayes, Supervisor of Equipment.

Award to Worthington

The production of rock drills, compressors, turbine well pumps, anti-

aircraft artillery and airplane parts has reached a state of "outstanding achievement" at the Holyoke Works of Worthington Pump & Machinery Co. and was recognized on October 22 by the presentation of the Army-Navy "E".

In commenting on the Award, Worthington stated that it takes great pride not only in the power of its "guns of construction" but also in the "guns of defense" turned out at Holyoke.

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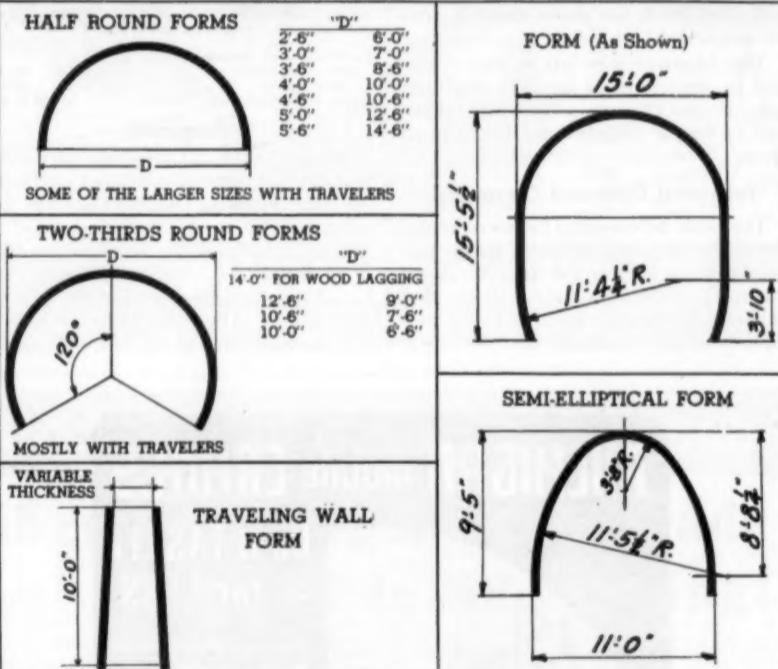
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THE OSGOOD COMPANY, Marion, Ohio

Analysis of Material On Soil-Cement Job

(Continued from page 30)

til it walked out within 2 inches of the top. This surface was then reshaped by a Warco Road Hog power grader and then a Farmall tractor pulling an Oliver spike-tooth harrow and a double wire broom drag at an angle was run over the surface a number of times to work up a mulch of the top 2 inches which had not been compacted. During this time any over-size stone, that is over 2 inches in diameter, was hand-picked and removed from the road. The contractor had a 750-gallon sprinkler truck with a 2-inch pump which was used to moisten the material during compaction and during the mulching operation if required. A light fog of water was applied just ahead of the rolling by a 10-ton steel 3-wheel roller but care had to be taken that the surface dried out sufficiently so that the roller would not pick up the material and leave an uneven or broken surface.

The steel-wheel roller was used first to secure a compact top layer and thus prevent any pneumatic-tired vehicles or equipment which might run over it from impressing ruts in the material. Immediately behind the steel-wheel roller a Bros pneumatic-tire roller was used for a considerable period to secure the final kneading action to compact the material below the top layer. The final polish rolling was done by the steel-wheel roller after another slight moistening of the surface. The finishing required about 2 hours after the mixing had stopped. Immediately thereafter the surface was covered with straw 3 inches deep and sprinkled continuously by the sprinkler truck for seven days to cure the soil-cement surface.

This highway was left in this condition to determine its wearing qualities. Later it may be given a light bituminous surface by the Maintenance Department forces.

Technical Data and Quantities

The table below gives the sieve analysis of the salvaged material which was used as the aggregate for the soil-cement surfacing. The various analyses that were made showed a remarkable uniformity in this material.

Screen Size	Per Cent Retained
1½-inch	0.8
1-inch	1.9
¾-inch	2.4
½-inch	3.4
No. 4	8.7
No. 10	26.0
No. 20	39.6
No. 270	21.6
0.05 to 0.005 mm silt	12.9
0.005 to 0.001 mm clay	2.6
Below 0.001 mm colloids	2.1

The following data on the character of the salvaged material was furnished through the courtesy of W. T. Spencer, Soils Engineer of the Indiana State Highway Commission, who maintained very close touch with this work throughout its operation.

Liquid limit	17.5
Plastic limit	14.2
Plasticity Index	3.3
Field moisture equivalent	17.2
(This is the amount of water required to fulfill the capillarity requirements of the material)	
Specific gravity	2.67
Shrinkage limit	11.8
Shrinkage ratio	2.0
Linear shrinkage	3.6
Volumetric change from field moisture equivalent	10.8
pH	7.4

The per cent of cement selected for best operation was 9.2 and the optimum moisture was 10.3. Taking the material from the No. 4 sieve and smaller, the aggregate weighs 124.7 pounds per cubic foot.

The south 1,000-foot section of relocated roadway in cut and fill had a variable raw soil with the following analysis, requiring 13.2 per cent of cement by volume for stabilization.

	Min.	Per Cent Max.	Average
Fine sand (passing No. 40 and retained on No. 270)	16	21	20
Silt (0.05 to 0.005 mm)	53	37	45
Clay (0.005 to 0.001 mm)	19	10	16
Colloids (below 0.001 mm)	7	4	6
Liquid limit	42	36	33
Plasticity Index	13	4	10
Shrinkage limit	17	17	17
Field moisture equivalent	35	24	30
Classification	A-5-7-4	A-4	A-4
Texture classification	Silty Clay	Sandy Clay	
	Loam	Loam	Loam

The quantities involved in the soil-cement processing operation were as follows:

Salvaged road material	20,147 cu. yds.
Pulverizing and processing salvaged road material	90,043 sq. yds.
Pulverizing and processing existing material in place	18,523 sq. yds.
Portland cement	11,185 lbs.
Water, 1,000-gallon units	501.68 M gals.

Personnel

Project 551-C&D, grading, structures and 20-foot cement-stabilized surfacing on 9.093 miles on Indiana Highway 267 was awarded to A. M. Skinner Co. of Morocco, Ind., on the recorded low bid of \$159,308.17. Elmer Skinner was General Superintendent for the general contractor. All soil-cement processing and finishing was done under a subcon-

tract by the Ohio Engineering Co. of Lorain, Ohio, for whom J. E. Phelps was Superintendent.

For the Indiana State Highway Commission, K. J. Zinkan was Project Engineer.

Announcement of the winners of our 1941-42 Roadside Development Awards to highway contractors for outstanding contributions to roadside development during the past two years will be made in our January issue.

NO Winter FREEZE-UPS



Even though duly delegated man-power may have instructions to provide against power equipment damage or slowdowns resulting from cold weather . . . the human equation can't always be depended upon to make good on its responsibilities.

There is nothing to freeze in a Wisconsin heavy-duty air-cooled engine. AIR-COOLING, and the ability to start easily in any weather . . . to run continuously under a full working load, on any kind of job within its power range . . . these are factors that logically make Wisconsin Engines the preferred year-round power.

WISCONSIN MOTOR
Corporation
MILWAUKEE, WISCONSIN, U. S. A.
World's Largest Builders of Heavy-Duty Air-Cooled Engines

Model VE-4 V-type 4 cyl. engine. Other types and sizes, 1 and 4 cyl. 1 to 35 hp.



Not all weapons use ammunition—some, like the Buckeye Clipper, use fuel. Clippers are speeding scores of war projects and defense highways to completion. They're handling vital materials in scrap yards, armament plants, mines and quarries, too. Clippers are helping to deliver a knockout blow to the Axis. Equipped with Mevac all-weather Vacuum Power Control, they handle more yards per shift with no extra fuel consumption and without operator fatigue. You're in the fight with a Buckeye CLIPPER SHOVEL with Vacuum Power Control. ½, ¾ and ¾ yd. Gasoline or Diesel. Convertible to crane, trench hoe, pile driver, dragline.

How to Make Your Shovel Last Longer!

1. Keep teeth points on the dipper sharp. (It saves fuel, oil and maintenance.)
2. Keep all parts well lubricated and clean. Accumulation of dirt gets into the moving parts and causes excessive wear and damage to the machine.
3. Don't allow your shovel—lifting loads beyond its capacity—giving on extra counter-weight—overshoveling and rough operation.
4. Don't allow cables to come wrap on the drum.
5. Keep crawler tracks adjusted properly.
6. Don't use abrasive material on shovels and hoes. If grease gets on the hoes, clean with gasoline.
7. Keep all joints on the vacuum system tight.
8. Change the oil in the motor crank case regularly.
9. Clean air cleaner regularly.
10. Use clean water in the radiator—check it out occasionally.

BUCKEYE TRACTION DITCHER CO. - FINDLAY, OHIO

Built by Buckeye

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-B FINEGRADERS, ROAD WIDENERS AND SPREADERS



MICHIGAN mobile CRANES

Do it FASTER -- for LESS!

Precision CRANE WORK moves faster with hi-speed MICHIGAN Air Controls. Heavy loads handled safely — Low Gravity Center for Stability; Heavy Duty Motors for power with economy. . . . Your request will bring MICHIGAN'S Work Book C. showing convertible MICHIGAN Mobile CRANES in action. Write for it today!

AIR CONTROLS

MICHIGAN America's Mobile Shovel-Crane Specialists
MICHIGAN POWER SHOVEL CO.
BENTON HARBOR, MICHIGAN

More Rigid Control Of Construction Tools Is Ordered By WPB

A new WPB order, L-192, effective November 30, 1942, virtually scraps all existing procedures and places the manufacture and sale of construction machinery and equipment under the direct control of the Director General for Operations of the War Production Board. The order, which covers practically all types of construction machinery and equipment, sets up production schedules, provides for the rigid allocation of critical materials based on such schedules, and prohibits production of certain types of equipment for civilian use. The restricted machinery listed in Schedule C of the order includes the 48 items which may be ordered and produced only for military purposes, as follows:

Batchers, construction-material
Batching plants, construction-type
Bins, construction-material, portable
Bins, construction-material, stationary
Brooms, contractor's rotary
Buckets, scraper (bottomless) for dragline operation
Buggies and carts, concrete, hand-operated
Buggies and carts, concrete, power-propelled
Centerline markers
Chutes, concrete-handling
Concrete surfacing machines
Conveyors, construction-material (except when a part of a portable crushing plant)
Derricks, guy
Derricks, stiffleg
Disk, road
Ditchers, blade
Dredges and dredge equipment
Drilling machines, core drill
Drilling machines, portable well
Driers, construction-aggregate (except portable type)
Filling machines, joint and crack
Finishers, floor, other than wood
Form tamping machines
Graders, blade or pull-type, earth-moving
Graders, elevating, earth-moving
Graders, self-propelled, earth-moving
Graders, under-truck type
Grapes
Heaters, asphalt surface
Hoists, contractors'
Hoppers, portable concrete
Joint levelers
Maintainers, road
Maintainers, shoulder
Mod-Jacks
Plants, asphalt (except portable travel-mix type)
Plows, cable-laying
Plows, snow, V and blade-type, truck, tractor or grader-mounted
Rollers, road, pneumatic-tired
Rollers, road, tandem
Rollers, road, three-wheel
Scrapers, drag, feso
Screening plants, portable-type
Sweepers, street
Sweepers, street, motor pick-up
Towers, concrete-placing
Towers, material-elevating
Washing and screening plants, portable type

The list below shows the various types of new machinery and equipment which may be bought, rented and sold by individual contractors and construction companies to other persons for their own account, provided an authorization by the Director General of Operations is secured.

Angledozers and modifications thereof
Bulldozers and modifications thereof
Cranes, crawler-mounted, power
Cranes, tractor-mounted, power
Cranes, rubber-tire-mounted, power
Crushers, jaw and roll, portable type
Crushing plants, portable type
Distributors, bituminous
Ditchers, ladder
Ditchers, wheel
Draglines, see cranes
Draglines, slackline
Draglines, walking
Drilling machines, rock, portable-mounted
Earth boring machines
Excavators, see power shovels
Finegraders and subgraders, self-propelled
Finishers, concrete
Finishers, bituminous paving
Forms, concrete road
Hammers, pile
Heaters and circulators, tank car
Loaders, portable, bucket (other than coal)
Mixers, bituminous cold-mix type, 10 tons per hour capacity or more
Mixers, concrete, agitator truck type
Mixers, concrete, truck-mounted with elevating towers
Mixers, concrete construction, above 10 cu. ft. size
Pavers, concrete
Plants, stabilizing
Plows, snow, rotary
Power control units for tractors, cable and hydraulic
Pumps; portable engine or electric-motor-driven pumping units mounted on skids, with or without handles

or trailer-mounted, larger than 20 M gph self-priming centrifugal pumps, horizontal or vertical triplex piston road pumps, ordinarily used for contractors' pumping or by contractors for dewatering and supply, as defined and approved in Contractors Pumps Standards by the A.G.C. of A., Inc., Feb. 21, 1941

Rippers, road

Rollers, road, portable

Scrapers, carrying and hauling, both drawn and self-propelled

Shovels, crawler-mounted, power

Shovels, rubber-tire-mounted, power

Shovels, tractor-mounted, power

Spreaders, concrete

Wagons, contractors', crawler

Winches, tractor-mounted

GEERPRES Mop Wringer

reduces mop costs from 25 to 50 per cent over other methods of wringing—retains the mop fabric in a soft fluffy condition most desirable for rapid mopping. No more loose mop strings to catch around legs of desks and furniture when using GEERPRES.

New construction makes this wringer last for many years. Made in two sizes, small size will wring mops 14 to 24 ounces inclusive, large size 20 to 36 ounces. Available with or without tanks. Send for free circulars and prices.

GEERPRES WRINGER, INC.
Manufacturers of High Grade Mopping Equipment
MUSKEGON, MICH.

DOUBLE STAGGERED GEARS
CANNOT POSSIBLY SIDESLIP
Gear Shaft Size Increased—Will
Not Warp Under Excessive Strains

Patent Pending



BUILT TO LAST* AND MOVE DIRT FAST**

* BUILT TO LAST! Every working day for 17 years, a Wellman Bucket has unloaded crushed rock and sand for the Concho Sand and Gravel Co., Oklahoma City. In all that time (17 years) not one cent was spent for repairs or maintenance.

** FAST! "Our Williams digs and fills in rock and shale better than any other bucket ever used."—F. F. Mengel Co. "We have never seen a bucket dig like our Williams does."—Central Contracting Co.

Williams users report many benefits like the above experiences. They confirm the facts that Williams Buckets are unusually rugged and durable in service and fast in action. It shows too why your next bucket should be a Williams.



DISTRIBUTORS IN
ALL PARTS OF THE
COUNTRY.

Each type of
Williams Bucket is
covered by individual
bulletin. Write
The Wellman
Engineering Co.
7812 Central Ave., Cleveland, Ohio

WILLIAMS Buckets
built by WELLMAN

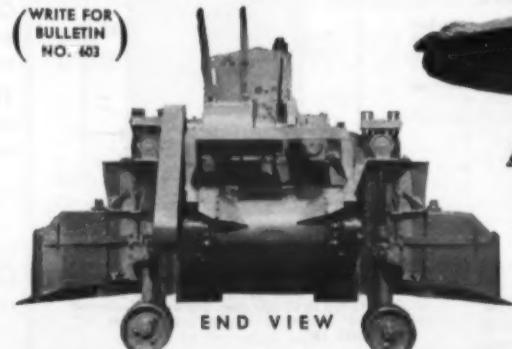
Make YOUR subgrading operations pay a profit:

**A STANDARD Subgrader prepares subgrade
at 50% to 90% saving!**

One operator and a helper can prepare subgrade with this machine at the lowest cost ever attained.

Not only does the efficiency of this machine cut down subgrading costs, but it will also lower your costs of rough grading, form setting, and concrete or asphalt placing.

(WRITE FOR
BULLETIN
NO. 403)



END VIEW



SIDE VIEW

And dollar losses due to voids and improper subgrade will be entirely eliminated.

This machine is building most of the airports in the West.

Detailed records to substantiate this claim are obtainable from contractors using these subgraders. Write us for further information.

**UNIVERSAL
ARC WELDING ELECTRODES**
Steel, Bronze, Hard-facing
Prompt Delivery

UNIVERSAL POWER CORP.
4297 Euclid Ave., Cleveland, Ohio

STANDARD STEEL CORPORATION 5001 So. Boyle
Los Angeles

Mucking and Dumping On Magoffin Contract

(Continued from page 25)

Loading and Firing

The method of loading holes in tunnel operation is one of the trade secrets which we respect and therefore do not report. However, we are permitted to say that in loading the holes 45 and 60 per cent du Pont Gelex is used, about half and half in each round. The round is fired from the firing station a minimum of 800 feet and a maximum of 2,000 feet from the heading, using no direct connections but ten delays. These delays are fired in the following order: 4 cut holes, 4 cut-hole relievers, 4 middle side relievers, 4 corner relievers, 2 top back-hole relievers, 4 side ring holes, 4 outer side ring holes, 2 top back holes, 2 knee holes, 2 middle lifters, and 2 bottom corners.

Mucking

Immediately after the firing of a round and the clearing of the heading of the powder fumes, the men return and start mucking. Two men trim loose rock from the sides and face, one man hoses down the rock to reduce dust, and one man tends the air hose of the mucker. There are also one shovel man, one car spotter, two locomotives with their operators, one handling six empties at the start which, with the shuttling as the Eimco mucker fills the car, transfers the loaded cars to the other locomotive. A single round in the non-supported section produces about 12 cars of muck which are taken out as one

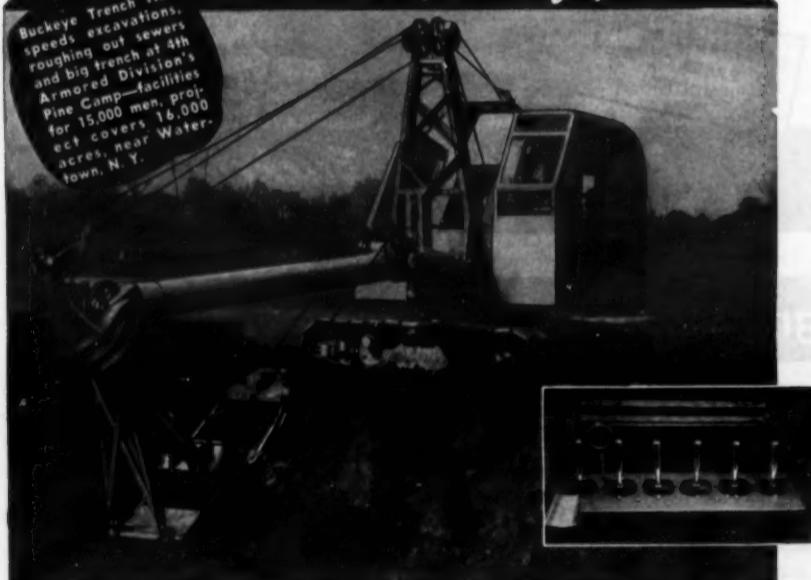


C. & E. M. Photo
Close-up of the automatic dumper for muck cars used by the S. S. Magoffin Co. on its contract for the east part of the Continental Divide Tunnel, Estes Park, Colo.

10-car train and the balance on another train. The Mancha electric locomotives handling the work at the heading will not handle more than the six loaded cars, while the hauling locomotives, larger Atlas machines, will haul the 10-car trains easily. Two spare muckers are kept on one of the sidings in case of breakdowns.

A Gardner-Denver pump attached to a grouting jumbo is kept on one of the sidings near the heading for use when needed but there has been relatively very little water encountered in the tunnel so that it has been used very infrequently.

Clipper Shovel Operators Lead the Life of Reilly!



yet average more yards on every shift

The Buckeye Clipper's Mevac (metered vacuum) Power Control makes shovel operating a "white collar" job. Six "palm fitting" handles—grouped with those used most in easiest reach—do the job smoothly and quickly, guiding the shovel through its work cycle. And yet the "feel" is as sensitive as on old steamship rigs.

Upheated operator's seat, arm rest, 21° clear view—no wonder operators deliver plus yardage right up to the end of the shift.

Vacuum Power Control saves for you, too, Boss—ask the maintenance men of those that own them!

Model "50", 1/2 yd. Model "60", 3/4 yd. Model "70", 3/4 yd.

Quickly convertible to crane, dragline, trench hoe, pile driver—gasoline or diesel powered.

BUCKEYE TRACTION DITCHER CO., Findlay, Ohio

Built by **Buckeye**

CONVERTIBLE SHOVELS, TRENCHERS AND BACKFILLERS, TRACTOR EQUIPMENT, R-E FINEGRADERS, ROAD WIDENERS AND SPREADERS



The Dump

The dumping of the cars at the spoil area near the portal is done entirely automatically, as the C. S. Card Iron Works cars are equipped for that purpose. Two heavy plates cast into the truck frames of the cars catch under a long rail on the automatic dumping device so that the trucks hold the rails. Just before the cars reach the tripping device, detachable dumpers are hooked to each car so that when the cars are pushed forward the heavy wheel on the dumper rides up over the steel ramp, tipping the cars at the same time the outer sides of the cars swing outward to release the muck. The tripping ramp may be moved along the dump track on a pair of angles as rails to which it is anchored by pins through the rails and the ramp itself. The accompanying illustration shows the cars with the detachable tipping device and being dumped by the ramp.

Outside Equipment

The compressor house for supplying

high-pressure air for the operation of the drills is located close to the portal and contains one Ingersoll-Rand Imperial Type 10 4-stage air compressor driven by a Westinghouse 250-hp motor and capable of delivering 1,200 cfm at sea level but actually, at this high altitude, delivering about 950 cfm at 125-pounds pressure. A second I-R compressor with a 200-hp General Electric motor makes up the regular unit. As standby units, a Gardner-Denver 7 1/2 x 5 3/4 x 5 and a Sullivan 10 x 5 3/4 x 5 compressor are installed in the same house. One of the large and the two small compressors are V-belt driven. In the compressor house is a South Bend lathe which is used for all overhauling operations on the air equipment.

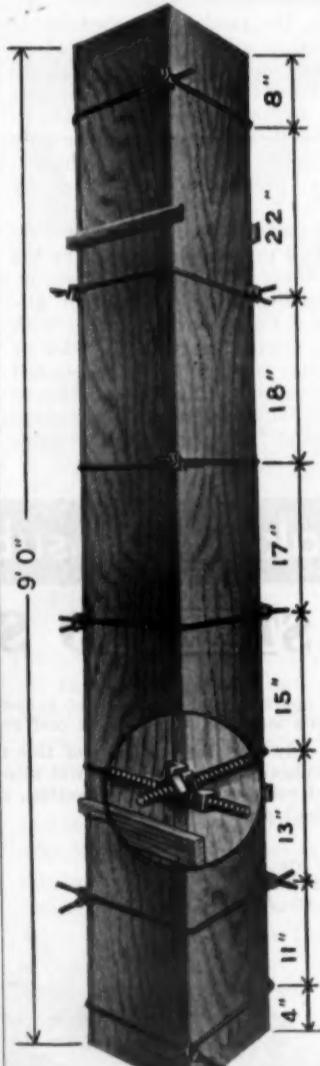
In the blacksmith shop are an oil heating furnace and an Ingersoll-Rand No. 54 drill sharpener. Installed for making steel wedges is an old Rand drifter rigged for use as a trip-hammer. In the adjacent section of the shop is the drill sharpening shop with entirely auto-

(Concluded on next page)

Cut Costs—Speed Your Work!

with

SUPERIOR COLUMN CLAMPS



The Superior Column Clamp was designed for use particularly for small columns and piers on such structures where the net concrete dimensions of columns does not exceed 12" square, and where the height is not excessive. On many such structures it has been common practice to use wood yokes. This, in general, is an expensive and wasteful procedure. The use of the Superior Column Clamp is by far the more economical method. This Clamp is extremely light, a set weighing only 4 lbs. It is extraordinarily quick to apply, and the purchase price is such that the investment is small.

SPECIFICATIONS

Two-piece clamp adjustable for columns 8" to 12" square, net concrete.

Forms: Lumber or steel, with or without cleats, not to exceed 3" total both sides for 12" column.

Weight: 4 lbs. per set.

Strength: Full strength of the 1/2" diameter rod.

Castings: Malleable iron to permit strength and safety of the assembly. Nuts cannot be removed from rods.

Threads: 9" of tough lag threads on each rod end. There are six threads to the inch, making for speed in erection and removal.

In tests, Superior Clamps performed satisfactorily when spaced as shown on the above column, 12" square, formed with 3/4" Plywood and poured to top in 15 minutes. Plywood deflected 1/8" between clamps spaced at 11" and 13".

For complete details on Superior Column Clamps and a complete line of other concrete construction accessories, write today for our new 45-page Catalog No. 300

SUPERIOR CONCRETE ACCESSORIES
4247 Diversey Avenue

Chicago, Illinois

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Good Progress Made On Long Tunnel Job

(Continued from preceding page)

matic control of heat for the bits which are milled while hot, then reheated and tempered in water.

The locomotive shop near the other shops is for the complete overhaul of the big hauling and the smaller electric locomotives used at the heading. In the shop are two variable-speed General Electric battery chargers. A smaller Hertner average-speed charger for the Mancha batteries is kept close to the heading and is moved every 2,500 feet, while 22,000 feet in the tunnel is another General Electric variable-speed battery charger for the Atlas haulage locomotives. A spare locomotive is always kept at this charger. In the shop, for handling the batteries and other heavy parts of the electric locomotives, are three Curtis air hoists, with others in the tunnel for similar service at the charger there.

Progress

On September 24, the east portal was 31,033 feet in. This means an average of 42.9 feet per 24-hour calendar day with no time out for shut-downs. The best progress was 74 feet in 24 hours in October, 1941. The contractor has averaged slightly more than $\frac{1}{4}$ mile per month or 3 miles per year on the second contract and the two work orders. The following table shows the progress that has been made on the west and east portals by the two contractors:

MONTHLY PROGRESS AT WEST AND EAST PORTALS CONTINENTAL DIVIDE TUNNEL

All figures are given for calendar days.

	Feet Progress	
	West	East
1942		
August	737	1,185
July	924*	1,249
June	1,371	1,329
May	1,424	1,370*
April	1,485	1,012
March	1,624	1,341
February	1,052	1,162
January	1,105	1,319
1941		
December	795	1,152
November	428	1,270
October	0	1,412
September	0	1,181
August	0	1,365
July	0	1,419
June	631***	1,390
May	905	1,567
April	879	1,405

Notes: *Progress reduced by short strike. **Operations shut down for one day to move blower ahead. ***End of Platt Rogers' contract.

As of September 25, 1942, 9.33 miles of tunnel had been completed or 71 per cent of the total length.

Operations at West Portal

Work at the west portal is under considerably different conditions. First, at this portal it was necessary to erect a snow shed to protect the trains coming out. The grade of the tunnel is toward the heading so that all water must be pumped upgrade away from the heading. This is done first by compressed-air pumps at the heading and then sump pumps, using wood pipe at the outer section where the pressure is less and spiral steel pipe nearer the heading. Stiers bought electric-eye controls for the block system in the tunnel but could not purchase sufficient cable to permit effective operation so the electric-eye system is not used. All hauling and

work at the heading is done by diesel locomotives, necessitating a much greater use of air for ventilating the tunnel at all points effectively.

Personnel

The Colorado-Big Thompson Project, of which the Continental Divide Tunnel is a part, is being constructed by the Bureau of Reclamation, S. O. Harper, Chief Engineer. For this project C. H. Howell is Project Engineer with F. K. Matejka, Tunnel Engineer at the east portal and Earl Stuver, Tunnel Engineer at the west portal.

The contractor for the operations at the east portal is S. S. Magoffin Co., Inc., of Englewood, Colo., with Frank Purvis as General Superintendent and Jack Guthrie, Head Walker, handling the day shift.

At the west portal the contractor is Stiers Bros. Construction Co. of St. Louis, Mo., with John Austin as General Superintendent.

Cement Dispersion And Its Advantages

The application of the principle of dispersion to cement in concrete has done much to improve the qualities of this structural product. The benefits secured in the plastic or workable stage are: 1. More placeable concrete with less water; 2. Increased fattiness; 3. Reduced segregation and bleeding; 4. Greater water retentivity; 5. Reduced shrinkage before hardening.

The improvements in the properties of the hardened concrete are as follows: 1. Increased durability; 2. Increased watertightness; 3. Higher strength; 4. Lower volume change; 5. Lower permeability or absorption; 6. Greater uniformity and freedom from gross defects.

Two discussions of this subject have recently come to our attention which we take pleasure in calling to the attention of our readers. The first, "Economics of Cement Dispersion" Research Paper No. 36, by Edward W. Scripture, Jr., discusses this from the technical standpoint, while the 32-page Bulletin "Pozzolith" also issued by The Master Builders Co., 7016 Euclid Avenue, Cleveland, Ohio, discusses the subject from the more practical standpoint of interest to the contractor.

Copies of these bulletins will be sent free on request to those writing direct to Master Builders and mentioning this item.

Portable Asphalt Plants

A new bulletin on Cedarapids Model E portable wheel-type electric, gas or diesel-driven asphalt plants has just been released by Iowa Mfg. Co., Cedar Rapids, Iowa. A feature of this bulletin is a step by step description of the setting up of one of these asphalt plants, with photographs and also diagrams to indicate the speed possible in the erection of the

plant and putting it to work after its arrival at the site.

Copies of this bulletin, which also includes complete specifications, may be secured direct from the manufacturer.

Remember—proper maintenance and regular lubrication will keep your construction and maintenance equipment working longer and more effectively for Victory!



GALION • GALION • GALION • GALION • GALION

Galion everywhere . . . working on access roads to airports, camps, navy yards and other Victory construction projects. People as well as machines must give everything possible—we have a war to win—let's go and go faster.



WE'RE IN IT
LET'S WIN IT

HENDRIX

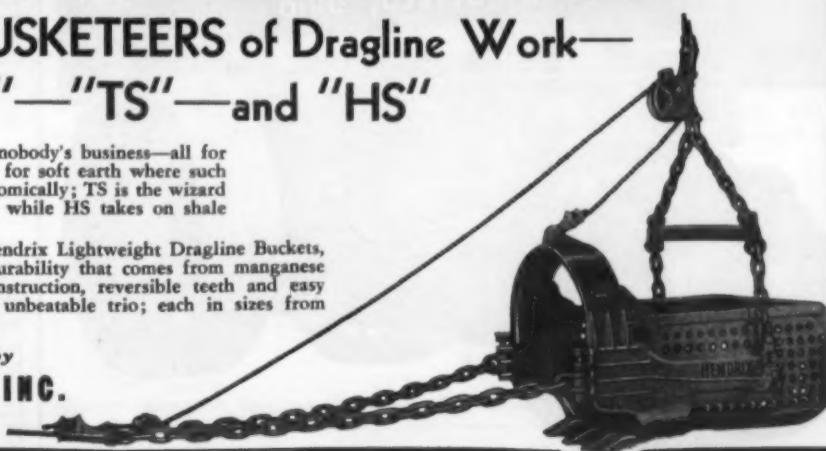
Lightweight DRAGLINE BUCKETS

The THREE MUSKETEERS of Dragline Work—
"LS"—"TS"—and "HS"

FIGHTERS all, who dig in like nobody's business—all for one and one for all. LS goes in for soft earth where such things as levees must be built economically; TS is the wizard of utility work in gravel or clay; while HS takes on shale or blasted rock.

Such is the story of Hendrix Lightweight Dragline Buckets, famous for stubborn durability that comes from manganese fittings, all welded construction, reversible teeth and easy operation. They're an unbeatable trio; each in sizes from $\frac{3}{8}$ to 20 cubic yards.

Scientifically manufactured by
DESOTO FOUNDRY, INC.
Mansfield, Louisiana



VULCAN TOOLS

A complete line for every type of Rock Drill, Pavement Breaker and Clay Digger.

Vulcan Tool Manufacturing Co.
3543 Liberty Street, Quincy, Mass.

Branch Offices and Warehouses Stocked:
74 Murray St. New York, N. Y. 34 No. Clinton St. Chicago, Ill.

Three More States Protect Road Funds

The voters of Iowa, Oregon and West Virginia voted overwhelmingly at the general election of November 3, 1942, to amend their respective state constitutions to require that all special highway taxes be spent for highway purposes. This increases to fourteen the number of states having constitutional amendments preventing the diversion of special highway taxes.

Proponents of the three amendments which were accepted by the voters declared that, because of reduced highway revenues resulting from wartime restrictions on motor-vehicle use, it is more important than ever to protect highway funds against diversion to non-highway purposes so that the maintenance of existing roads may continue to save tires and equipment, that highways may be extended and modernized for strategic military purposes, and that funds will be available for the modernization and improvement of highways after the war.

Kansas and Missouri in 1928 were the first states to safeguard highway funds by amendments to their constitutions. Prior to the November elections similar action had also been taken in California, Colorado, Idaho, Michigan, Minnesota, Nevada, New Hampshire, North Dakota and South Dakota.

Bucyrus-Erie Wins Award

Bucyrus-Erie Co., Milwaukee, Wis., manufacturer of sturdy shovels and cranes used in a wide variety of construction activities directly connected with the war, is also engaged in manufacturing ordnance material. For its outstanding record of production in this field, the South Milwaukee Plant received the Army-Navy "E" Award on November 7.

The Award ceremonies were highlighted by an impressive salute to members of the armed forces who have given their lives to the service of the country.

Directory of EQUIPMENT DISTRIBUTORS

The following cards (arranged by states) show the names of dealers in contractors' equipment and supplies, with a record of various lines handled.

GARLINGHOUSE BROS.

2416 E. 16th St. Los Angeles, Calif.

Southern California Distributors for

BROWNING—Truck Cranes, Shovels, Locomotive Cranes

DEMSTER—Dumpsters

DIAMOND IRON WORKS—Crushers, Portable Gravel

Plants

DAVEY—Compressors

LAMBERT—NATIONAL—Hoists and Cableways

McKERNAN—TERRY CORP.—Pile Hammers

W. LESCHEN & SONS—Wire Rope

OMAHA—Dragline Buckets

OWEN—Clamshell Buckets

RANSOME—Concrete Mixers, Pavers, etc.

UNIVERSAL—Panel Forms, Form Clamps, etc.

Manufacturers of

GAR-BRO—Concrete Carts, Wheelbarrows, Concrete Hoppers, Buckets, etc.

Member: Associated Equipment Distributors

EDWARD R. BACON CO.

Folsom at 17th St.

San Francisco, Calif.

Aerol Emulsion Distrib.

American Concrete Grinders

"Berg" Concrete Surfers

Crane & Trenchers

Dobbie Derricks, Fittings

Erie Rollers

Gar-Bro Barrows, Carts

Hercules Power Units

Hillside Sweepers

Huber Trucks

Interstate Tramways

Jackson Concrete Vibrators

Jasper Mixers, Pumps,

Hoists, Paving Equip.

Jones Saw Benches

Kramer Clamshell Buckets

Kohler Lighting Plants

Littleford Wheeled Rollers

McKernan-Terry Pile Ham-

mers

Miller Shovels, Cranes,

Dragline

Neisen Bucket Loaders

Ohio Locomotive Cranes

Papa Dragline Buckets

Porta Conveyors

Rogers Bros. Trailers

Sehrmann Air Compressors

Symons Cone Crusher, Vi-

brating Screens

Ther. Air Tools

Towle Torches

Ward Pumps

Winslow Scales

Member: Associated Equipment Distributors

NORRIS K. DAVIS

400 Seventh St. San Francisco, Calif.

Representing

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Gardner-Denver Co.—Front End Loaders Timken-Bits

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Colorado State Highway Dept. Photos
Left, a Coleman widener working on drifted snow on a Colorado state highway. Right, an Adams grader and snow wing working in Vail Pass, Colo. See page 10.



C. & E. M. Photos
Above, a metal drop inlet set in the oil-mat curb on U. S. 30 east of Cheyenne, Wyoming.



U. S. Army Photo
The final operation on a western air field runway—spraying the Process membrane cure on the surface of the new concrete. See page 10.



At right, another method of removing water from the roadway on fills: an oil-mat spillway with the bituminous curb contained down the sides to confine the water. See page 6.



Looking toward the left abutment of Keswick Dam in California, with concrete work just starting in the spillway section. This dam, for which Atkinson Kier Co. is the contractor, is a part of the Bureau of Reclamation's Central Valley Project. It is being built 9 miles downstream from Shasta Dam and will provide a reservoir with a total capacity of 25,000 acre-feet. See page 19.



Top photo, a section of the Continental Divide Tunnel, Bates Pass, Colo., 9,000 feet from the heading, showing the exceptionally dry atmosphere, a result of careful ventilation using reverse blow. Bottom photo, a train of muck cars from the east heading of the tunnel being dumped by the C. E. Card automatic dumper. E. Magoffin Co. contractor. See page 2.